Obesity is an escalating problem worldwide, often attributed to diet but with strong genetic contributions. Genetic studies have begun to identify obesity genes, but current model organisms for these studies are problematic. We are exploring mouse lemurs, the smallest and fastest-reproducing primates, as a genetic model organism for primate biology, behavior and diseases. Mouse lemur physiology has been studied in France since 1967, but little is known of their genetics. As a step toward mouse lemur genetics, we screened hundreds of individuals in Madagascar and the colony at CNRS Brunoy for interesting phenotypes, and identified an obese lemur in the Brunoy colony. This individual is consistently obese, began gaining excessive weight young, and has obese relatives, consistent with a genetic cause. We hypothesize that this animal has a genetic form of obesity that affects its behavior or metabolism, and the cause can be identified by genetic mapping and sequencing. We will collaborate with French colleagues to identify the obesity mutation and gene and initiate a genetic and molecular understanding of body weight control in mouse lemurs. This would establish mouse lemurs as the first primate genetic model organism, with implications for understanding lemur health and conservation and potentially human obesity.