DNA Applications for forensic entomology. General lessons for forensic non-human DNA analysis.

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Although the great majority of forensic DNA analyses target human samples, investigators are also concerned with the genetic profiles of non-humans, such as bioterror agents, domestic animals, and protected species. However, in contrast to human identity and paternity testing, few official standards have been adopted for non-human DNA in a forensic context. Forensic (and other) insects can be a source of human DNA, but a variety of investigative tools have been practiced or proposed based on DNA from the insects themselves. These will be discussed within the larger context of non-human DNA profiling.

Perhaps the most common non-human application is species determination. Mitochondrial DNA sequence data has been widely used as an identification tool for Diptera collected during a death investigation. Most often an immature specimen is identified when its haplotype is somehow "matched" to a reference haplotype from an adult that was identified morphologically. Things that are generally needed for reliable species determination for any taxonomic group, such as properly curated voucher specimens associated with a reference genotype, a useful set of reference taxa, and empirical validation, are particularly important for supporting expert testimony.

Population genetic protocols for most species are less well developed compared to those for human short tandem repeat loci. However, useful inferences are still possible in the absence of standard allele proportion data, and methods exist for producing a complex genetic profile for a species for which we have no genomic information. For forensic insects, AFLP methods have permitted us to measure population genetic structure and kinship, both of which have forensic implications.