A31 Geographic Origins of Illegally Harvested Hawksbill Sea Turtle Products

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After attending this presentation, attendees will learn about the extraction of mitochondrial DNA (mtDNA) from illegal tortoiseshell items made from hawksbill sea turtles shells. The origin (natal beach) of the poached sea turtle can be estimated using mtDNA haplotype analysis, which can be used to focus conservation and anti-illegal poaching efforts.

This presentation will impact the forensic science community by identifying a methodology to forensically process tortoiseshell and offer insight on how mtDNA haplotypes can be used to inform wildlife and government officials about where illegal poaching is occurring. For example, the Dominican Republic government recently cracked down on tortoiseshell sales, confiscating the illegal items and drastically reducing the number of items openly available. Yet, hawksbill objects are still found in markets both in the Dominican Republic and around the world. This research will directly aid law enforcement capabilities by determining from where these endangered animals are being illegally harvested.

The hawksbill sea turtle (*Eretrmochelys imbricata*) is one of seven sea turtle species, all of which are protected by international law**.** One of the distinguishing characteristics of the hawksbill sea turtle is its carapace (shell), which is covered with keratinous overlapping plates called scutes. These scutes are the source of tortoiseshell products, which are widely though illegally available in countries around the world. Scutes are molded and pasted together with water and heat into products such as glasses, jewelry, and small boxes. The tortoiseshell trade is one of the main causes of the hawksbill sea turtle endangered status. Unfortunately, given the global range of hawksbills, it has been impossible to discern the origin of illegally sold tortoiseshell items; such items could originate locally or be shipped from distant locations. This makes conservation efforts difficult or impossible, as illegal harvesting and trafficking routes are not defined.

In the research presented, DNA was first extracted from the shell of hawksbill museum specimens to test the feasibility of DNA recovery. Species specific PCR primers were designed to amplify approximately 440 base pairs of the mitochondrial control region. The amplicons were then sequenced using the same primer set, after which mtDNA sequences were analyzed and haplotypes determined. Next, tortoiseshell items were obtained from the U.S. Fish and Wildlife Service from stockpiles confiscated from individuals entering the United States. mtDNA was again purified, amplified, sequenced, and haplotypes determined. Importantly, haplotypes corresponding to the geographic origins of hawksbills are available as a result of population structure studies of this species, which show nesting site uniqueness and fidelity. Such uniqueness allows for insight into the geographic origin of poached turtles, which was then determined for all illegal hawksbill items.

The extraction of mtDNA from tortoiseshell items has never before been accomplished, thus it represents a unique and powerful new tool for law enforcement and endangered species conservation. Methods developed and data collected during this research, combined with the existing database of sea turtle haplotypes, for the first time allows precise targeting of efforts to stem the illegal taking of these endangered and internationally protected turtles.

Mitochondrial DNA, Wildlife forensics, Tortoiseshell

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