Developing a Protocol to Extract DNA from Killer Whale Mucus as a Non-Invasive Alternative to the Use of Biopsy Darts

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Current methods of retrieving DNA from killer whales in the wild include the use of biopsy darts, which are invasive and potentially deleterious to the animal. Developing technology could allow scientists to collect mucus samples from wild killer whales using drones, providing a humane alternative to darts. This experiment sought to develop a protocol to extract DNA from the mucus of a killer whale, then to find if analysis of the CO1 gene could be used to differentiate between whale ecotypes for studying population sustainability. As routine husbandry behavior, trainers at a zoological facility collected mucus samples from killer whales. At the high school lab, a protocol for DNA extraction was developed using a modified silica resin procedure. Protocol changes included mucus removal from blow plates using lysis solution and a sterile spreader; suspension of DNA in 50ul of dH2O rather than 100ul for concentration; and an increased volume of template DNA used in PCR. These changes allowed for the development of a protocol for DNA extraction from mucus, amplification of the CO1 gene by PCR, made visible by electrophoresis, with 68% effectiveness. PCR products were sent out for Sanger sequencing. BLAST results revealed that the CO1 gene is not diverse enough to differentiate ecotype. Further research continues to examine the use of different genes for ecotype investigation. Protocol instructions for mucus collection height and shipping methodology are necessary for more consistent results. Drone studies to collect samples are necessary so this research can be taken into field studies.

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