A method of identifying bird species from a blood-stain or shred of tissue.

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Abstract

In many cases the remains of a struck bird are not sufficiently complete to perform a reliable identification based on secondary characteristics. DNA technique of Polymerase Chain Reaction, PCR, are by now applicable for species identification in bird strikes. Only minute amounts of DNA are needed, because this technique is capable of replicating enough identical DNA for base sequencing. Collecting and preparing blood stains and tissue remains can easily be carried out by everybody. Blood and finely partitioned tissue is dropped in a Nunc cryo-tube filled with a buffer solution and can be stored at room temperature or in a refrigerator. Alternatively, materials can be collected in a clean plastic folie and stored in a deep freezer.

A proportionally large number of birds involved in bird strikes fail to be categorized into species. In many of such cases the remains of the struck bird are not sufficiently complete to perform a reliable identification based on secondary characteristics. However, blood and flesh remains being left on aircraft body are in fact a species specific characteristic if the heritage material of the bird is considered. DNA techniques are by now applicable for species identification in bird strikes.

The aim of this paper is to draw attention to the application of the new DNA technique of Polymerase Chain Reaction, PCR, as an ultimative method of identifying bird species when other procedures are inadequate. Further, based on this DNA technique followed by direct sequencing it will in some cases be possible to detect geographical origin of the individual involved. Furthermore, it is possibly to state whether a blood-stain detected on an aircraft really originates from a carcass actually found on/near the runway.

At the Institute of Population Biology, Zoological Museum, Copenhagen, application of PCR technique is at an advanced stage. The information present in this paper derives merely from a personal conversation with Dr. Peter Arctander from this institute and from papers published (e.g. Arctander & Fjeldså 1991, Fjeldså & Arctander 1989).

This PCR based technique differs from other known DNA approaches in analysing the base sequence. Furthermore, only minute amounts of DNA are needed, because this technique is capable of replicating enough identical DNA for base sequencing. The application of PCR technique can now go on routinely and rationally, and is effective. However, as the work is still in a developmental stage PCR analysis implying a high cost accounting to use. The actual price of a total PCR sequencing analysis, from sending in a test sample to receiving an answer, is quoted to be a sum around about 150 USD. This price, however, will be reduced markedly in future.

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As yet, a DNA reference collection of comparative sequences is not established for all known or potential species involved in bird strikes. However, test samples from around one thousand of species from all over the world are actually collected and stored at the Zoological Museum in collaboration with the Institute of Population Biology, Copenhagen. This sampling is still going on, but a program for base sequence analysis of the collection stills awaits starting.

On the other hand, collecting and preparing blood stains and tissue remains is very cheap to perform and can easily be carried out by everybody without complicated instructions. Furthermore, storage of test material pose no problems. Thus, henceforth there is no harm in collecting DNA samples for storage in situations where alternative tools for species identification are inapplicable. Hopefully, some day when PCR tests are adequate we have not missed our opportunities if, for instance, bird strike statistics are needed for identification of the species in question.

How are we to sample and store collected material in practice? DNA is a stable molecyle. Under conditions experienced in bird strikes the bird remains on aircraft is mostly dryed by wind and sun or by freezing. In such cases DNA molecyles are often kept intact suitable for analysis. Blood (fresh or dryed) and finely partitioned tissue is dropped in a 1.5 ml. Nunc cryo-tube filled with a buffer solution. Recommended buffer is 25% DMSO (Dimethyl Sulfoxide) with 5M NaCl. This solution prevents oxidizing and enzymatic degradation of DNA. When sampling has finished the tube can be stored at room temperature. For longtime storage it is recommended to use a refrigerator. As the PCR technique is very sensitive to contamination with foreign DNA clean equipment must therefore be used when sampling. Alternatively, without having disposal of buffer filled cryotubes, materials can be collected in a clean plastic folie and stored in a deep freezer.

References

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