Cracked eggs reveal secret life

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Once you have a data base of genetic information, you can see who is related to who… it's a way of exploring the private lives of these birds.— Dr Haile. Credit: Flickr: James Marvin Phelps

Australian researchers have found a breakthrough technique that uses eggshells from endangered and extinct birds as a molecular resource—revealing insights into the behaviour and evolutionary history of Australian feathered fauna.

Murdoch University's Dr. James Haile says eggshell has been largely overlooked as a substrate despite its impermeability and resistance to decay, owing largely to the calcium carbonate matrix which acts to protect biomolecules.

Dr. Haile says researchers take the eggs of extinct and endangered birds and grind them down before sequencing the DNA to learn new

information about these birds.

“For extinct birds such as Madagascar’s elephant bird, we extract the DNA and compare that to living birds such as emu, cassowary, ostrich and others—from that we can see how those birds fit into the broader family tree and at what point they diverged,” Dr. Haile says.

“For the endangered birds, we take samples of abandoned eggshells and together with DNA samples from chicks and captive birds, develop a population database to get a picture of genetic diversity of the population.”

Dr. Haile says the application of his research can help to identify smuggled eggs coming into Australia and learn more about the behavior of Australia’s endangered birds for conservation strategies.

He says it could even help determine the precise timing of the fragmentation of the supercontinent Gondwana.

“For the endangered birds such as Australian megapodes and cockatoos, once you have a data base of genetic information, you can see who is related to who, what is the dispersal of their chicks? How many times a female has mated and if her partner dies will she find another?” Dr. Haile says.

“It’s a way of exploring the private lives of these birds.”

“For the extinct birds, we know elephant birds were related to emus, cassowaries and others, but we aren’t sure how closely they were related because bones don’t preserve DNA very well due to the heat as well as being very rare.

“Elephant bird eggs are the largest ever known, bigger than any dinosaur

egg, and very resistant to decay so they're an ideal but under research source of DNA."

Dr. Haile says future research will improve enrichment techniques to concentrate endogenous DNA from contaminant DNA and will then use that in conjunction with second generation sequencing technologies, which produces up to a million DNA sequences from one sample.

Provided by ScienceNetwork Western Australia

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