

Notes on a new method to identify Golden Bandicoot and Northern Brown Bandicoot in the Kimberley region

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ABSTRACT – The two species of bandicoots that occur in the Kimberley region are particularly difficult to tell apart as they have no distinctive features other than size. A new method is proposed here to identify the two species based on dental measurements, by taking an imprint of the teeth with dental impression paste. The new technique can accurately reproduce the size of the teeth and help identify the species quickly and cheaply. This method still needs to be tested on live specimens but provides an alternative to species identification using DNA analysis.

KEYWORDS: Dental imprint, *Isoodon*, species identification

INTRODUCTION

The Kimberley region in Western Australia is the home of two species of bandicoots, the smaller Golden Bandicoot, *Isoodon auratus* (Ramsay 1887), and the larger Northern Brown Bandicoot, *Isoodon macrourus macrourus* (Gould 1842; Van Dyck and Strahan 2008). While the name of each species suggest that they can be identified using pelage colour, this is not the case, as both are brown in overall colour, which renders the identification of individual specimens quite difficult, with overall size the only way to tell them apart in the field. However, size is problematic as a young Northern Brown Bandicoot can be the same size as an adult Golden Bandicoot. A genetic sample can be used to verify the identification, but this is a costly method and takes time before the results are known. A cheaper and faster method would be therefore welcomed to identify the two species in the field (S. Cameron pers. comm.). Considering that the two species are easily identifiable using dental and cranial morphology (Warburton and Travouillon 2016), a new method is proposed here using dental impression paste as a way to identify the two species.

METHODS

The new method was tested on a recently deceased Golden Bandicoot specimen (WAM M65293), collected from Mitchell Falls, Mitchell Plateau, Kimberley. The specimen was thawed a day prior to make sure its mouth could be easily opened. SS White Impression paste was used to take the dental impression. The white-zinc

oxide paste was mixed in equal amount with the red-eugenol paste to form a single pink paste (Figure 1A). The directions for use suggest that it can be used after 30 seconds of mixing, up to 2 minutes 45 seconds. When the paste was applied to the teeth during that working window, the paste was too sticky and was hard to remove from the teeth. During a second attempt, at least 3 minutes passed before it was applied, making sure it was dry to the touch, with a plastic stick (Figure 1B), used to press the paste onto the upper molars to obtain an imprint. The second attempt was successful, and a clean imprint was recovered very quickly by pressing gently on the upper molars (Figure 1C–D). It took less than 5 seconds to open the mouth and obtain the imprint before closing the mouth again.

The imprint was photographed and measured using a Leica microscope M205 A, with a Leica camera DMC4500. Measurements of the molars were then compared to measurements taken on museum specimens, using callipers, for both the Kimberley Golden Bandicoot (*Isoodon auratus*) and the Northern Brown Bandicoot (*Isoodon macrourus macrourus*). All specimens of the Kimberley Golden Bandicoot are from the Western Australian Museum (Perth). Specimens of the Northern Brown Bandicoot are from the Western Australian Museum (Perth), Natural History Museum (London, UK), Queensland Museum (Brisbane), Australian National Wildlife Collection (Canberra), Museum and Art Gallery of the Northern Territory (Darwin) and the Australian Museum (Sydney). The measurements were summarised as univariate statistics, analysed in the software PAST (Hammer et al. 2001).

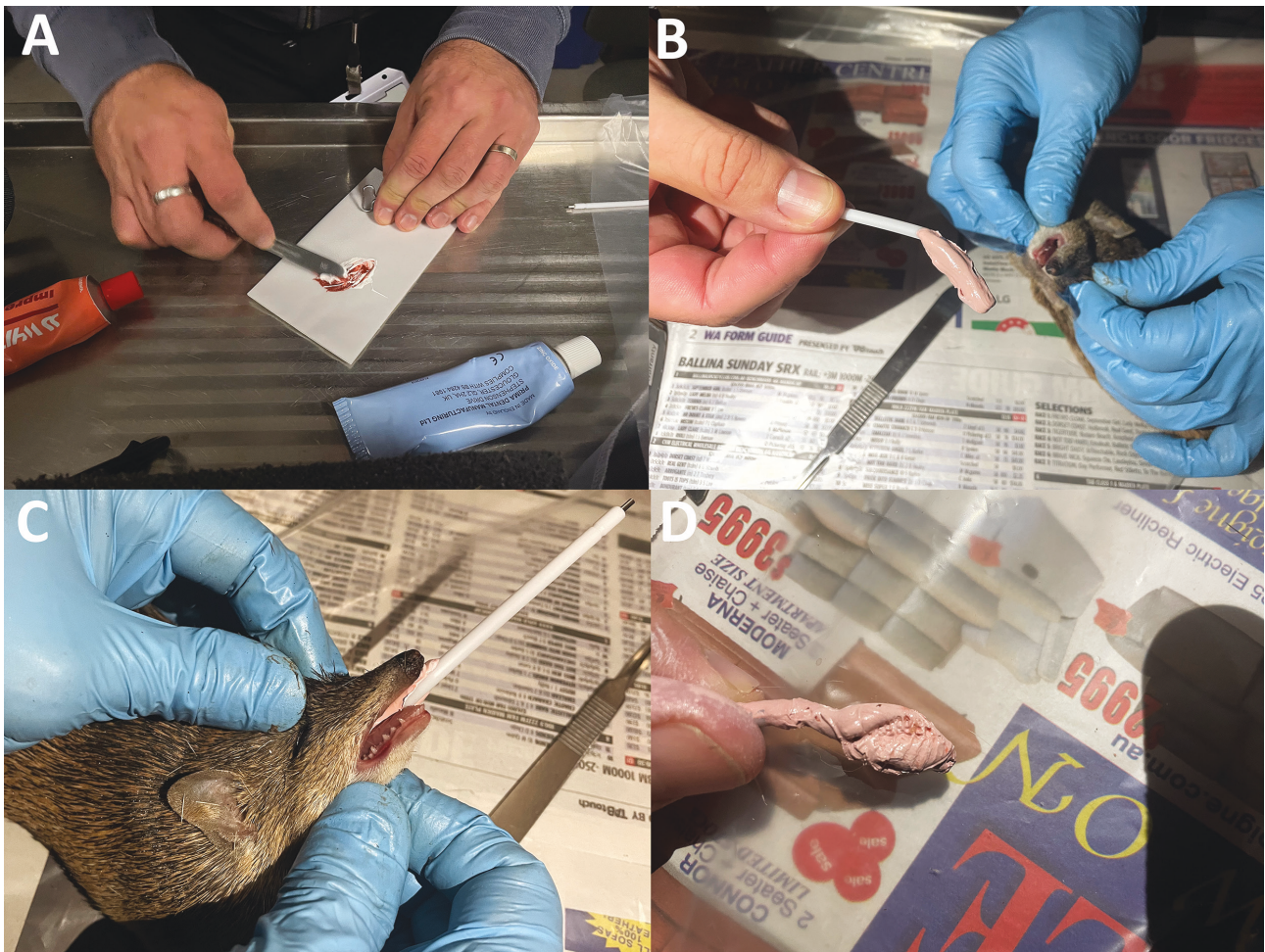


FIGURE 1 Photos showing each step of the dental paste method.

RESULTS

The imprint successfully reproduced the shape and size of the M1, M2 and a partial M3 (Figure 2A). The measurements were taken digitally on the photograph taken with the Leica microscope, but callipers could have been equally successful. When compared with the actual teeth measurements, after the specimen was prepared (Figure 2B), the measurements are very close for the lengths of M1–3, but the width is much less accurate, and is overestimated in the dental imprint.

Univariate statistics for the dental measurements for the two species of bandicoots are shown in Table 1. Measurements of the M4 and m4 are not provided here, as it is unlikely that an imprint of these teeth can be done easily as they are further back in the mouth. All measurements taken on the imprint fall within the range of the Golden bandicoot.

DISCUSSION

The new method presented here successfully recovered an accurate imprint of the teeth of the animal, allowing them to be measured to identify the species.

There is little overlap in the dental measurements of the two species (Table 1), which makes this method very easy to use. It should be useable in the field, only taking minutes to prepare the impression paste, so it can be applied very quickly, and get a result soon afterwards. The lengths of the teeth imprints are the most accurate representation of teeth measurements and should be used primarily. Despite the difference in measurements for the widths between the imprints and the teeth, the imprint measurements are still within the range expected for the Golden Bandicoot, and therefore can still be used for the identification.

This method has only been tested on a single recently dead specimen and should be tested on living specimens before it can be widely used, but ethics approval will be required to test this method in the field. The biggest challenge is not the method itself, but getting the animal to open and close its mouth without causing too much stress to the animal. However, a tickle under the chin seems to trigger the mouth of bandicoots to open widely (S. Cameron, pers. comm.). If this is correct, this means that it should be relatively easy to do this method.

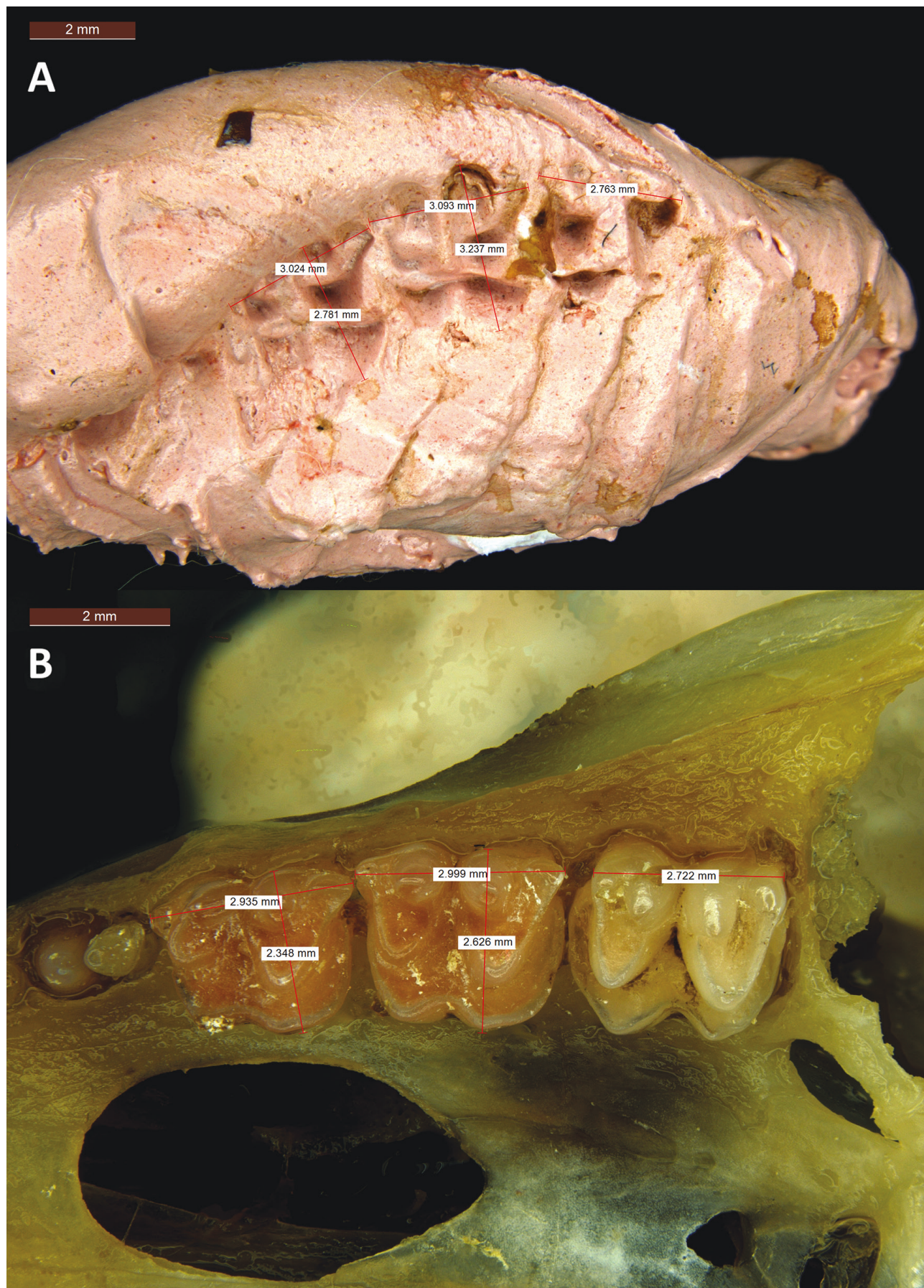


FIGURE 2 Golden Bandicoot, *Isoodon auratus* (WAM M65293). A) dental imprint of the left M1-3, with measurements; B) left M1-3 with measurements.

TABLE 1 Univariate statistics of dental measurements of the upper (M1-M3) and lower molars (m1–3). L = length, AW = anterior width, PW = posterior width, W = width.

	M1L	M1W	M2L	M2W	M3L	M3W	m1L	m1AW	m1PW	m2L	m2AW	m2PW	m3L	m3AW	m3PW
<i>Isoodon auratus</i> (Kimberley population)															
Sample size (N)	34	34	34	34	32	32	36	36	36	36	36	36	36	36	36
Minimum size	2.72	2.42	2.62	2.69	2.35	2.08	2.45	1.48	1.79	2.61	1.91	2.16	2.70	2.01	2.11
Maximum size	3.30	3.00	3.43	3.36	3.34	3.60	3.14	1.91	2.34	3.37	2.34	2.74	3.33	2.35	2.65
Mean	3.03	2.72	2.95	2.97	2.82	3.18	2.76	1.70	2.08	3.02	2.08	2.43	3.05	2.16	2.33
<i>Isoodon macrourus macrourus</i>															
Sample size (N)	120	120	129	129	126	126	125	125	125	126	126	126	122	122	122
Minimum size	3.21	2.99	3.36	3.20	3.56	3.43	2.93	1.96	2.31	3.16	2.27	2.74	3.06	2.30	2.53
Maximum size	4.45	4.12	4.28	4.84	4.65	5.03	4.20	2.86	3.20	4.59	3.46	4.07	4.78	3.30	4.02
Mean	3.82	3.56	3.78	3.99	4.07	4.19	3.43	2.28	2.72	3.79	2.78	3.17	4.00	2.95	3.07

ACKNOWLEDGEMENTS

I would like to thank Dr Skye Cameron who contacted me about coming up with a new method, and this came to fruition as part of our conversations. I would like to thank the Wunambal Gaambera people, Tom Vigilante and Shane Clugston from Bush Heritage for letting me collect the specimen of Golden Bandicoot used to undertake this method. I would like to thank Jenelle Ritchie, Mark Harvey, and the local rangers for helping check the traps. I would like to thank Salvador Gomez and Yanlin Li for preparing the specimen for the WA Museum collection. I also thank the staff of the Natural History Museum (London, UK), Queensland Museum (Brisbane), Australian National Wildlife Collection (Canberra), Museum and Art Gallery of the Northern Territory (Darwin) and the Australian Museum (Sydney) for providing access to their specimens.

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MANUSCRIPT RECEIVED 24 JUNE 2022; ACCEPTED 8 DECEMBER 2022.