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Retaining the 'art': Painted Button-quail *Turnix varius* do make platelets in north-eastern Queensland

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Abstract. Button-quail *Turnix* spp. forage in a unique manner, leaving behind circular scratched depressions in the substrate known as platelets. These platelets offer an indirect method of surveying an otherwise cryptic and shy group of birds. Painted Button-quail *T. varius* are well known for creating platelets throughout most of their distribution. However, following 8 years of surveys from 1992 to 2000 in North Queensland, Nielsen (2000, p. 25) failed to locate any platelets and questioned whether Painted Button-quail in North Queensland may have "lost the art of forming platelets?". During surveys in North Queensland between 2017 and 2022, we found extensive evidence at multiple locations of Painted Button-quail creating platelets that were consistent in size, shape, and placement with descriptions from elsewhere throughout the species' distribution. A marked seasonal difference in occurrence and density of platelets was detected. Platelets were scarce from January to April, which coincides with the wet season, and increased in abundance throughout the dry season, with a peak at the end of the dry season (September–December). Platelets may represent a viable method for detecting Painted Button-quail in North Queensland, particularly during the dry season.

Introduction

As ground-dwelling birds, button-quail *Turnix* spp. appear to forage exclusively within the substrate of their environment where they have developed a unique method of uncovering food items. The method involves the bird scratching with one foot while using the other as a pivot to rotate clockwise and counter-clockwise multiple times, scratching away the top layer of soil, humus or leaf-litter (Debus 1996). In its wake it leaves behind circular depressions in the substrate known as 'platelets' (McConnell & Hobson 1995). Though many other species of bird similarly scratch the substrate to uncover food items, the circular depressions left by button-quail are unique. All Australian button-quail species appear to scratch platelets (McLennan 1922; McConnell & Hobson 1995; Debus 1996; Webster & Stoetzel 2021; P. Webster pers. obs.), which are remarkably consistent across the genus, despite species occurring in markedly different habitats from arid deserts to moist woodlands and forests (Debus 1996).

Being unique to button-quail, platelets have been used as an indirect means of detecting and surveying various species of button-quail, which can otherwise be difficult to detect (McConnell & Hobson 1995; Debus 1996; Gutiérrez-Expósito *et al.* 2019; Yarwood *et al.* 2019; Webster & Stoetzel 2021). Caution is required to determine which species is responsible for the platelet in locations where multiple species of similar-sized button-quail co-occur (McConnell & Hobson 1995).

One species of button-quail known to make platelets throughout most of its southern and western distribution is the Painted Button-quail *T. varius*. Hindwood (1937, p. 61) noted that around Sydney the species' presence was often revealed by "small more or less circular patches of exposed earth". Multiple observers have reported the species forming platelets in south-eastern Queensland (Hughes & Hughes 1991; McConnell & Hobson 1995). In Yacka, South Australia, Pedler (1975, p. 4) observed "many small bare patches about 10cm across" in areas where Painted Button-quail were observed. The Houtman Abrolhos Painted Button-quail *T. v. scintillans*, which occurs on the Houtman Abrolhos Islands off the coast of south-western Western Australia, also forms platelets (Blyth *et al.* 2006; Newell *et al.* 2017). Additionally, there are documented reports of Painted Button-quail making platelets in Tasmania (Loofs-Samorzewski & Dick 2018), the Australian Capital Territory (Wallace 2022), Victoria (Wnorowski & Wnorowski 2017) and Western Australia (G. Groom pers. comm. 2022).

Despite widespread records of platelet formation by Painted Button-quail, following 8 years of field surveys for button-quail in North Queensland, Nielsen (2000, p. 25) found only a few erratic scratchings; "no well-formed platelets could be clearly discerned". At the time, local ornithologists discussed this observation and also concluded that they had failed to locate platelets belonging to Painted Button-quail in North Queensland (Nielsen 2000). It was hypothesised that (1) the hard soils of North Queensland may prevent button-quail, at least in this region, from forming platelets, or that (2) they could have distinctive diets, and therefore do not need to scratch for their food. Nielsen (2000) proposed that these factors meant that this species might have 'lost the art of forming platelets' in this part of its distribution.

Here, we document our observations of Painted Button-quail making platelets at multiple sites throughout North Queensland.

Methods and study sites

From August 2017 to June 2022, dedicated surveys for button-quail were conducted throughout North Queensland, from the Atherton Tablelands, north to approximately Lockhart Community. These surveys primarily targeted Buff-breasted Button-quail *T. olivii*, although every button-quail encountered was recorded. Surveys were conducted in every month of the year by observers walking through areas thought to represent suitable habitat for button-quail, or areas where they had previously been recorded. As the detection of platelets is a known method for detecting button-quail (McConnell & Hobson 1995), the substrate at each survey site was closely monitored for the presence of platelets. If platelets were found, a concerted effort was made to determine what species of button-quail was present. This was done by attempting to observe the button-quail at the site; failing this, the species was identified by remotely monitoring the area with camera traps (HF2X, Reconyx, Wisconsin, USA) or acoustic recording units (Song Meter 4, Wildlife Acoustics, Massachusetts, USA). Unfortunately, as this manuscript was the result of unplanned observations conducted while searching for another species (Buff-breasted Button-quail), the details of survey effort per site with regard to Painted Button-quail do not enable thorough analysis.

Results

The platelets of positively identified Painted Button-quail were detected at 18 broad localities in North Queensland from Millstream in the south to Kalpowar in the north (Table 1, Figure 1). Painted Button-quail were detected

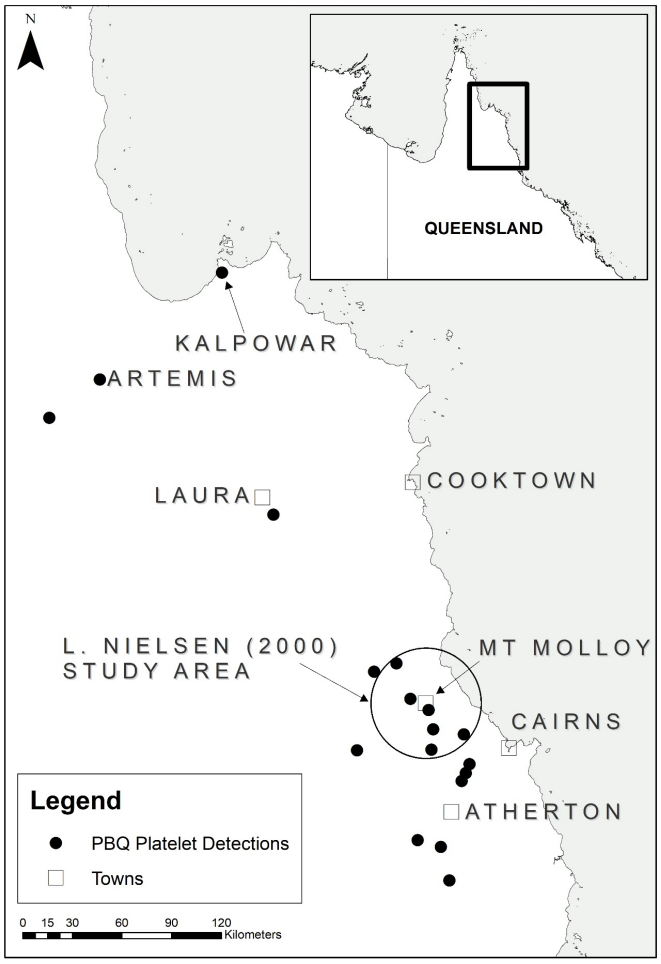

Figure 1. Map of locations where platelets of Painted Button-quail (PBQ) were detected. Circle surrounding Mt Molloy depicts the 30-km-radius study area of Nielsen (2000) where no platelets were found from 1992 to 2000.

Table 1. Sites where Painted Button-quail were recorded during the study period, and whether platelets were detected at that site in the wet (January–April) and dry (May–December) seasons.

	Latitude, longitude	*Platelets detected*	
Site		*Wet season*	*Dry season*
Mareeba Wetlands	S16.926, E145.361	Yes	Yes
Mount Carbine (Brooklyn)	S16.538, E145.097	No	Yes
Kalpowar	S14.333, E144.221	Not visited	Yes
Artemis	S14.915, E143.558	No	Yes
Laura	S15.650, E144.502	Not visited	Yes
Dixie	S15.123, E143.281	Yes	Not visited
Mt Molloy (Wetherby Station)	S16.711, E145.347	Yes	Yes
Lake Mitchell (Mulligan Highway)	S16.816, E145.369	No	Yes
Koah	S16.840, E145.534	Yes	Not visited
Emerald Creek	S17.055, E145.538	No	Yes
Emu Creek	S17.103, E145.525	Not visited	Yes
Davies Creek	S17.004, E145.568	No	Yes
Mt Spurgeon	S16.439, E145.168	Not visited	Yes
Millstream	S17.635, E145.459	Yes	Not visited
Silver Valley	S17.414, E145.287	No	Yes
Mt Mulligan	S16.931, E144.957	No	Yes
Wondecla	S17.456, E145.413	Not visited	Yes
Maryfarms (Brooklyn)	S16.611, E145.210	Yes	Yes

in all areas of suitable habitat searched south of around Mount Carbine, but only sporadically in sites of suitable habitat north of Mount Carbine (see also Webster *et al.* 2022). At all sites where Painted Button-quail were detected, the presence of platelets was also detected. The platelets reported here were reliably attributed to Painted Button-quail based on one or more of the following: visually observing the species scratching platelets, capturing on camera trap the species scratching platelets, observing the species at a site with fresh platelets, or recording the species remotely via camera trap or acoustic recorders where fresh platelets were detected.

Seasonal occurrence and density of platelets

Platelets were detected in each year of the study period and at least once for each month (for example, only one record was made for January throughout the study period), although the abundance of platelets varied markedly through the year. No direct measures of abundance were taken but the following observations were made. Platelets were infrequently detected during the wet season. Throughout the study period, they were recorded only once for each month from January to April. The occurrence and density of platelets appeared to increase throughout the year, with a noticeable increase towards the end of the dry season. The highest density of platelets documented was 116 platelets in an area of 16 m^2 recorded in October 2021 at Artemis Station (Figure 2). A density of 14 platelets in 1m^2 was recorded in September 2020 at Mareeba Wetlands, with a further 100 counted in the immediate surrounding area (approximately 25 m^2).

Platelet placement and construction

Platelets were typically made amongst tussocks of perennial and annual grass in areas of leaf-litter, gravel or bare soil (Figure 3). The substrate on which platelets

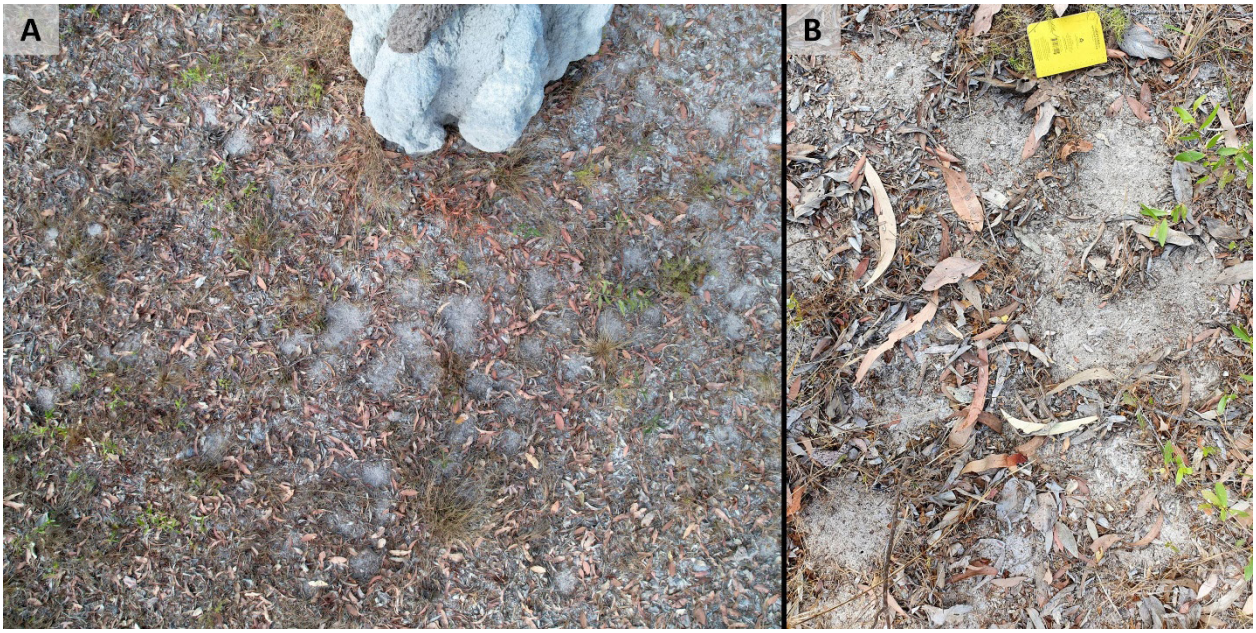

Figure 2. High densities of Painted Button-quail platelets in North Queensland. (A) Elevated photograph showing 59 platelets taken at Artemis Station in October 2021. (B) Close-up showing distinct individual platelets and clusters of two or three merged platelets. Photos: Patrick T.D. Webster

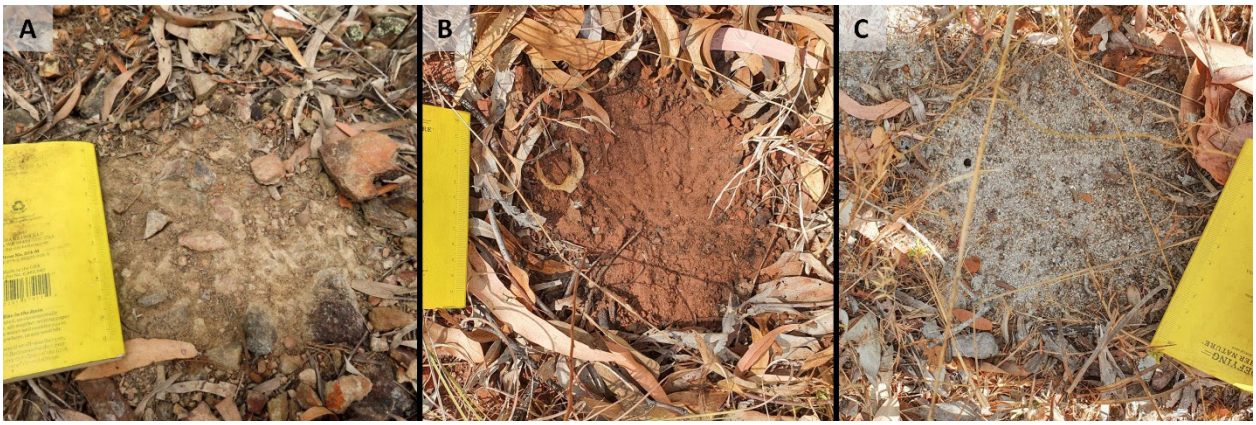

Figure 3. Platelets of Painted Button-quail from North Queensland made in varying substrates. (A) Compacted hard substrate of skeletal gravelly soil at Mareeba Wetlands. (B) Loose gravelly red loam at Kalpowar. (C) Friable sand at Artemis Station. Although difficult to discern in these photographs, note that in the hard gravelly soil (A) the platelet does not penetrate the soil whereas in the looser soils (B, C) a clear depression is formed. Photos: Patrick T.D. Webster

were constructed varied. At Mareeba Wetlands and at Emerald Creek (Lamb Range), platelets were often made on skeletal stony substrates (Figure 3A). These platelets often involved the movement of gravel and small rocks. At Artemis Station, platelets were made in areas of loose sand (Figure 3C). Platelets of Painted Button-quail were typically 13–17 cm in diameter. On occasion, two or more platelets made alongside each other and overlapping can give the impression of a much larger platelet, sometimes >20 cm across.

Discussion

In eight years of observing Painted Button-quail in North Queensland, Nielsen (2000) never saw the species making platelets, nor found evidence to suggest that the species does make platelets. In contrast, our observations over four years of research suggest that Painted Button-quail in North Queensland make platelets frequently, particularly at certain times of the year. This behaviour is consistent with the foraging behaviour documented elsewhere through the species' range. The platelets that we found were consistent in size, shape, density and placement with Painted Button-quail platelets described from other locations. Although McConnell & Hobson (1995) noted platelets of this species up to 9 cm deep in friable soil, platelets of this depth were not observed during our surveys. Platelets were detected in each year of our study, although there was a noticeable decrease in their presence or detection during the wet season.

This apparent seasonal variation in platelet formation could have three, non-exclusive explanations. Firstly, the lack of platelets during the wet season could potentially be a result of fewer platelets being produced, suggesting that Painted Button-quail forage in a different manner during this period. Button-quail scratch platelets to uncover food items, which in the case of the Painted Button-quail are small invertebrates and seeds (Barker & Vestjens 1989). Potentially more food is present during the wet season, negating the need to scratch platelets. Secondly, the frequent rainfall events that characterise the wet season in North Queensland may also wash away or erase platelets, making them harder to identify, or removing them entirely. The period for which a platelet remains detectable is unknown; however, deeply scratched platelets during the dry season may be present for many weeks (P. Webster pers. obs.). The high density of platelets that were observed towards the end of the dry season may be a result of an accumulation of platelets over months without rain to erase them. Thirdly, an increase in ground-cover vegetation during the wet season may make detection of platelets more difficult; however, despite targeted searches for platelets in the wet season, very few were detected, suggesting that the latter is unlikely. The drivers of seasonal change in occurrence and density of platelets remain unknown and are worthy of further investigation.

The lack of platelets observed by Nielsen (2000) and other local ornithologists in North Queensland at that time was in contrast to our findings. The reason why platelets were not observed by Nielsen (2000) during his 1992–2000 study period is not easily discerned. Painted Button-quail were recorded in North Queensland in the years before 1992 (Bourke & Austin 1947; Bravery 1970; Squire 1990), during Nielsen's study period (Rogers 1995), and again in the years following 2000 (Chaplin 2011; Mathieson & Smith 2017; Smith & Mathieson 2019). Nielsen also reported seeing Painted Button-quail in all years during his study period in the areas where surveys were conducted (L. Nielsen pers. comm. 2022). Nielsen searched for button-quail in every month of the year during his study period (L. Nielsen pers. comm. 2022), so the seasonal variability that we had detected does not explain why Nielsen (2000) and others did not detect platelets. We have shown evidence of Painted Button-quail foraging in the hard, skeletal and gravelly soils that Nielsen (2000) proposed may be a factor preventing the formation of platelets. Additionally, analysis of Painted Button-quail faeces from North Queensland suggests that this species' diet consists of a diversity of invertebrates and seeds (P. Webster unpubl. data) as it does across the species' distribution (Barker & Vestjens 1989). Nielsen (2000) speculated that an altered diet for Painted Button-quail in North Queensland could explain the lack of platelets; this suggestion appears unsupported. Given that this foraging style is well documented in Painted Button-quail, and that we found evidence of the species making platelets in North Queensland, it seems anomalous that Nielsen (2000) detected no platelets despite this species being present during his study.

The foraging behaviours of Painted Button-quail in North Queensland appear to be consistent with populations of this species throughout its distribution. We therefore recommend surveying for platelets as an effective method of detecting button-quail in North Queensland, particularly in the dry season. It is evident in our findings that there are seasonal changes in the occurrence of platelets made by Painted Button-quail, although the drivers of this change remain unknown. Further investigation into these drivers and the suitability of surveys for platelets as a detection technique for this and other button-quail species is required.

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