THE 'IMMARNA' GRASSWRENS OF R.C. CHANDLER: LOCALITY, HABITAT, IDENTITY AND TAXONOMIC IMPLICATIONS

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ABSTRACT

Two specimens of Thick-billed (or Western) Grasswren *Amytornis textilis* taken by R.C. Chandler on 16 January 1909 in the Yellabinna region, Great Victoria Desert, have been the subject of much ambiguity in the literature of grasswrens and overlooked in reviews of birds of the region. As far as can be determined, they were taken about 132 miles (*c.* 210 km) west of Tarcoola near the locality of Bates Railway Siding (and rather nearer to Barton than Immarna) in the elevated dunes, known colloquially as the Barton Sandhills, a part of the Yellabinna region. Evidence suggests that the birds were taken in a plant community prevalent in the region, namely an open woodland/tall shrubland of black oak *Casuarina pauper*, sugarwood *Myoporum platycarpum*, mallee *Eucalyptus* spp. and mulga *Acacia* spp., with a diverse tall and medium shrub mid-storey and a low shrub layer including chenopods. While the habitat and the sand dune landform might seem atypical for the species, they are not so unexpected given the extensive range and variety of habitats formerly occupied by *A. textilis* in Western Australia. The specimens are typical of the subspecies *A.t. myall*.

Though all three subspecies *(textilis, myall* and *modestus)* are included in the *List of Vertebrates of South Australia* (Robinson, Hutchinson and Casperson 2000), the nominate subspecies *textilis* has not been recorded in South Australia. In view of demonstrated morphological and genetic differences and in consideration of contrasting biogeography and differences in habitat requirements, the separation of *A. textilis* into two species is advocated, *viz.* Western Grasswren *A. textilis* with two subspecies *textilis* and *myall,* and Thick-billed Grasswren *A. modestus.*

INTRODUCTION

The Thick-billed Grasswren *Amytornis textilis* is today primarily a species of the chenopod shrublands of southern inland Australia. It has two main groups of populations. The eastern group is paler with dull striations and a shorter tail of much the same length in each sex, and a shorter, deeper bill (Schodde 1982a). This group inhabits the basins of Lakes Eyre, Torrens and Frome (and formerly inland New South Wales) (see Black and Baxter 2003). It is recognised as the subspecies *A.t. modestus,* which was long considered a separate species (e.g. Whitlock 1924; RAOU 1926; Campbell 1927), though most recent authors have followed Parker (1972), including it as a subspecies of *A. textilis.* The western group is larger, generally darker (though with a north to south colour gradation – Gloger's Rule), boldly striated and exceptionally long tailed, particularly in males (Schodde 1982a). This group consists of two currently recognised subspecies, *A.t. myall* in the Gawler Ranges/Whyalla region of South Australia (SA) and *A.t. textilis* in southern inland Western Australia (WA). The species appears to have become extinct in much of southern WA since European settlement. It is now confined (as *A.t. textilis)* to the Shark Bay and doubtfully the Exmouth Gulf districts (Blakers, Davies and Reilly 1984), and was not shown conclusively to occur on the Nullarbor Plain, except perhaps by Gibson (1909), despite the presence of apparently suitable habitat (White 1919; Whitlock 1922; Collins 1943; Brooker *et al.* 1979; Schodde 1982a).

There is only a single authenticated record of the grasswren between the easternmost specimen records of *A.t. textilis* from near Kalgoorlie, WA (Gibson 1909; North 1910; Schodde 1982a) and the Gawler Ranges population of *A.t. myall,* a distance of *c.* 1500 km. R.C. Chandler collected two specimens on 16 January 1909 in the 'Ooldea District' to the east of the Nullarbor Plain (Campbell 1927), which are currently held in the American Museum of Natural History, New York (AMNH) and Museum Victoria (MV). The collection locality has come to be known as Immarna (30°29'S, 132°09'E), after a former railway siding nearby (see Parker 1972), and is 400–500 km from the nearest records in the Gawler Ranges (Higgins, Peter and Steele 2001; G. Carpenter, pers. comm.).

The initial aim of this study was to determine the true locality where Chandler's grasswrens were collected because the presumed locality 132 or 142 miles west of Tarcoola (Parker 1972), or near Immarna (Condon 1962, 1968-9), seemed most unlikely to hold habitat suitable for *Amytornis textilis.* My initial enquiries confirmed the apparently anomalous locality of Chandler's specimens, and the study's scope was widened to include a review of the habitats occupied by *A. textilis,* the recent distribution of the species (or species group), including the issue of whether or not it is present on the Nullarbor Plain, and an analysis of the differences between the western and eastern forms of *A. textilis* and whether these

represent separate species.

METHODS

I sought historical information on the construction of the then East–West Railway (Pt Augusta to Kalgoorlie) (now Trans-Australia Railway) because the commonly presumed locality of Chandler's grasswren specimens was described in relationship to the railway, yet the collecting occurred before its construction.

Enquiries were undertaken to obtain historical information about the collector R.C. Chandler and specifically to determine if he had collected other specimens from the same locality at the time, or from other places whose location might indicate his route. An attempt was made to find any living relative of R.C. Chandler who might have knowledge or documentation of his travels.

Chandler's two grasswren specimens were borrowed from the AMNH and MV and compared with a series of *Amytornis textilis* in: the South Australian Museum (SAM); Australian Museum, Sydney (AM); MV; and Australian National Wildlife Collection, CSIRO, Canberra (ANWC). Specimen data were obtained from the Western Australian Museum (WAM), but the specimens themselves could not be examined due to asbestos removal in the collection building at the time.

From 18 to 25 April 2003, my wife Margaret, Ron and Margaret Gibbs, and I followed the route presumed to have been taken by R.C. Chandler, *viz.* following the railway line between Wilgena Station and Ooldea. We spent at least four hours each day searching localities along this route identifying all birds seen, their numbers and the habitats they occupied. A tape recording of calls of *Amytornis textilis* made by Graeme Chapman was played intermittently during searches in habitats potentially suitable for the species.

RESULTS

The specimens

I examined Chandler's two specimens and compared them with the series of 22 *Amytornis textilis (sensu lato)* in the SAM. These consisted of one of the subspecies *textilis* from Beverley, south-western WA; eight *myall* from Nonning, Mt Ive, Mt Miccollo and Kolendo in the Gawler Ranges, SA and from eight miles south of Whyalla, SA; and 13 *modestus* from Myrtle Springs near Copley in the south through Marree, Margaret Creek (west of Lake Eyre) and Oodnadatta, SA to Fountain Springs, Northern Territory (NT).

I subsequently examined specimens from the AM, MV, and ANWC. In the AM these consisted of three from Central Australia including the type of *modestus* from Mereenie Bluff, NT (North 1902) and one from Mossgiel, New South Wales (NSW) collected by K.H. Bennett in May 1898. The MV specimens included one of Chandler's two skins R10002 (v.i.), one *modestus* from Mungeranie, SA, taken by E.D.B. Nicholls on 9 June 1922, one from 'S.A.' from the Robert Hall collection that is typical *myall* and 24 in the H.L. White collection. These last consist of ten *modestus* from Hermannsburg, NT, taken by F.L. Whitlock in 1923, three *textilis* from Lake Way, WA (F.L. Whitlock in 1909), two from Kalgoorlie, WA (C.G. Gibson in 1910), four from the Peron Peninsula, Shark Bay, WA (F.L. Whitlock in 1918 and 1920) and five from Dirk Hartog Island, WA (Tom Carter in 1916). The ANWC specimens were of 13 *modestus* from 10 km S to 17 km N of Lyndhurst, SA and two *myall*, one each from the Gawler and Middleback Ranges, SA. The WAM database referred to *A. textilis textilis* only (i.e. all WA birds) and included a single specimen from Dirk Hartog Island (Tom Carter in 1916), eight from the extant Shark Bay population, and seven from the Lake Austin region, between Cue in the north and Yalgoo and Mt Magnet in the south (J.T. Tunney in 1899, F.L. Whitlock in 1903 and J.P. Rogers in 1908). It also referred to A.F. Crossman's specimen from near Beverley (Crossman 1908) which was 'lost' from the WAM. This skin is almost certainly the one in the SAM labelled from Beverley and 'exchange(d from) Perth Museum'.

Also available for comparison were high resolution digitised photographs from the Gould collection of three specimens from NSW and the two 'type' specimens of *Amytis macrourus* (synomyn of *Amytornis t. textilis*) collected by John Gilbert at Wongan Hills north east of Perth, WA, all of which were transmitted from the Academy of Natural Sciences Philadelphia by Dr Leo Joseph.

The two Chandler specimens were labelled as follows:

1. AMNH 265213 (N)MV R 1000! sex male *Amytornis textilis* Dum. 142 miles W of Tarcoola, S Australia (E-W Railway) from R.C. Chandler 26.3.09 Collector R.C. Chandler

16.1.09.

2. (N)MV R 10002 sex male *Diaphorillas textilis* [*myall* - added in pencil] 132 miles W of Tarcoola Sth Aus. shot in mulga and other open scrub with very little undergrowth. From R.C. Chandler 26.3.09 Iris brown, bill black, feet black Collector R.C. Chandler 16.1.09. [additional paper label] 108 male 16/1/09.

While both specimens were labelled male, R 10002 (= 108) has chestnut colour patches on the sides of the breast and is therefore presumed to be female, as noted by Parker (1972).

The morphological differences between the two western forms (*A.t. textilis* and *A.t. myall*) and eastern *(A.t. modestus)* were detailed by Schodde (1982a), Schodde and Mason (1999) and Higgins *et al.* (2001). *A.t. textilis* was largest, strongly streaked and long-tailed, particularly the males. *A.t. modestus* had the shortest tail, with little sexual dimorphism, and was smallest and palest, and so dully streaked on the underparts that these markings were at times barely visible. The bill of *modestus* was also the deepest and most rounded or stubby (see Tables 1 and 2). From my examination of specimens, I found that this was especially evident in the profile of the lower mandible, which showed a pronounced convexity in all specimens of *modestus* with only a short concavity near the base. In *myall* the lower mandible was almost straight, with only a subtle convexity in some and a longer though more gradual concavity proximally. Of interest, this distinction in bill shape between *myall* and *modestus* was more pronounced than between *textilis* and *modestus*. In *textilis* the lower mandible, while showing variation, was generally more convex than in *myall* and thus approached the more consistent and more obvious convexity found in *modestus* (ABB, pers. obs.). Most other characters in *myall* were similar to *textilis* but the tail was somewhat shorter and perhaps less sexually disproportionate (Schodde 1982a). I found that specimens of *textilis* and *myall* were consistently darker on the face, throat and breast, the pale streaking on these parts being much more pronounced as a consequence. The two Kalgoorlie birds *(textilis)* were the darkest of all examined. Peron Peninsula birds, but not those from Dirk Hartog Island, were paler dorsally than other *textilis*, thus approaching *modestus* in this character (ABB, pers. obs.).

The Chandler birds matched the form *myall* closely. They were a little paler than three of the series of *myall* in the SAM but darker than two others. They had tails of equal length, which, like *myall,* were intermediate between those of *textilis* and *modestus*. They also showed the relatively pale abdomen of *myall*, which though reported to be lacking or less pronounced in *textilis* (Schodde 1982a) was certainly seen in some WA birds. The specimens showed none of the traits of *modestus*, including those of NSW specimens, though as Parker (1972) noted the latter were rather darker dorsally, one specimen also being slightly darker on the throat and upper breast (Gloger's Rule).

Chandler's collection and journey

R.C. Chandler's two grasswren specimens were included amongst 124 bird skins collected between Tarcoola and Ooldea which he presented to the National Museum of Victoria, now Museum Victoria on 26 March 1909. One of the two grasswren specimens subsequently was exchanged with the AMNH (Parker 1972). The MV's database has a number of dates and localities for these specimens. See Black and Longmore (2004) for details including the annotated list of specimens.

Evidence relating to locality and habitat

Campbell (1927) gave the locality of '108 male' as '140 miles west of Tarcoola SA, i.e. Ooldea District', but for '109 female' he merely gave it as 'Ooldea District'. Parker (1972) cited the localities from the specimen labels thus: NMV R 10002 adult female (labelled male) (field number 108) 132 miles west of Tarcoola; and AMNH 265213 male (formerly NMV 10001, field number missing) 142 miles west of Tarcoola. Parker (1972) pointed out that Condon (1962; 1968–9), who presumably had no direct access to Chandler's skins, merely referred to specimens from Tarcoola and Ooldea, and assigned them to the subspecies *textilis*, assuming or implying a continuous distribution from these points into WA. In the same publications, however, Condon included the place name Immarna as a locality for *A.t. myall*, which as Parker pointed out is 150 miles west of Tarcoola. Blakers, Davies and Reilly (1984) and Rowley and Russell (1997) referred to specimens from Immarna as the subspecies *myall.*

Chandler's notebook recorded collection 60 (the specimens 108 and 109) as from 110 miles west of 'Whymbring Well'. Only one symbol for male was recognisable. Chandler used the local-

Table 1. Measurements (mm) of *Amytornis* taxa. S = Schodde (1982a), H = Higgins, Peter and Steele (2001); see these sources for details. N = number of specimens, SD = standard deviation. Bill lengths: S^1 = exposed culmen; H^2 = from junction of skull and culmen, H^3 = from anterior margin of nostril.

		textilis						*myall*						*modestus*					
		Male			Female			Male			Female			Male			Female		
		N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Wing	S	*13*	66.3	2.0	*12*	64.8	2.2	*6*	64.7	1.5	*3*	63.7	2.1	*?*	61.3	2.1	*?*	60.1	2.0
	H	*11*	66.8	2.1	*6*	64.5	1.1	*8*	65.6	1.6	*4*	65.0	2.5	*13*	61.5	1.8	*7*	60.3	2.0
Tail	S	*13*	91.8	2.0	*12*	85.6	4.6	*6*	85.2	2.8	*3*	80.5	3.5	*?*	75.9	5.4	*?*	74.7	6.4
	H	*11*	92.4	6.9	*6*	87.5	5.0	*8*	91.3	2.6	*3*	85	5	*13*	75.4	5.8	*7*	73.0	2.9
Bill length	S^1	*13*	10.7	0.8	*12*	10.8	0.4	*6*	11.4	0.4	*3*	10.7	0.4	*?*	10.7	0.6	*?*	9.9	0.5
	H^2	*11*	14.9	0.6	*6*	14.6	0.6	*5*	13.6	0.7	*4*	13.8	1.3	*13*	13.3	0.9	*7*	13.3	1.1
	H^3	*11*	7.7	0.5	*6*	7.7	0.5	*7*	7.8	0.7	*4*	7.6	0.4	*13*	7.4	0.5	*7*	7.2	0.5
Bill depth	S	*13*	5.2	0.4	*12*	5.0	0.2	*6*	5.3	0.4	*3*	5.0	0.3	*?*	5.6	0.4	*?*	5.2	0.4
	H	*11*	5.1	0.3	*6*	5.0	0.2	*7*	5.3	0.3	*4*	5.1	0.1	*13*	5.5	0.2	*7*	5.3	0.3
Tarsus	S	*13*	25.2	0.8	*12*	25.5	1.2	*6*	25.6	0.9	*3*	24.2	0.2	*?*	24.8	1.0	*?*	23.5	0.8
	H	*11*	25.1	1.0	*6*	25.9	0.9	*8*	25.8	0.9	*4*	24.9	0.6	*13*	24.8	0.7	*7*	23.9	0.4

Table 2. Plumage characters of *Amytornis* taxa, summarised from Higgins, Peter and Steele (2001) and, in brackets, Schodde (1982a) and Schodde and Mason (1999).

	textilis	*myall*	*modestus*
Nape and neck	Dark brown (Dark to mid grey-brown)	– (Rather dark grey-brown)	Light brown to light grey-brown (Drab brown)
Face	Dark brown (Dark to mid grey-brown)	– (Dark grey-brown)	Dull white, mottled (Drab pale brown)
Mantle, scapulars and back	Brown to light brown (Dark to mid grey-brown)	– (Rather dark grey-brown)	Light brown to light grey-brown (drab brown)
Throat and breast	Light brown to brown (Pale fawn brown)	– (Pale fawn-brown)	Cream to pale buff, pale brown in centre (Dull fawn-white)
Belly	Dull white (Pale fawn-brown to whitish)	– (White)	Pale buff (Dull fawn-white)
Other underparts	Light brown (Pale fawn-brown)	– (Pale fawn-brown)	Pale buff (Dull fawn-white)
Shaft streaks	Long, white with dark brown to dark olive-brown borders (Long and white, edged black)	– (Long and white, edged black)	Shorter, white with dark brown borders (Short and off-white, edged dusky brown)

ity name of Wynbring (spelt variously as Whymbring, Whympring and Whymbering) extensively in his notes, whereas specimen labels in MV carried the name Kychering in its place. The hill, rockhole and soak known then by the name of Kychering are now usually known as Malbooma (see Black and Longmore 2004, including map).

Historical records of the Commonwealth Railways (Luke 1997) show that Malbooma Railway Siding (RS) is 22 miles (38 km) west of Tarcoola whereas Wynbring RS is 64 miles (103 km) west. If Chandler had taken the grasswrens 110 miles west of Wynbring, he would have been five miles west of Ooldea on the treeless plain. On the other hand if his notes are interpreted as

him being 110 miles west of Kychering (Malbooma), this figure is the same as 132 miles west of Tarcoola. It is clear from his notes and the MV database (see Black and Longmore 2004) that these were collected before he reached Ooldea. Accordingly, A.J. Campbell (1927) corrected a consistent error in Chandler's notes, changing any use of the name Whymbring and its variations to Kychering. Thus the corrected, presumed and approximate locality of Chandler's grasswrens, 110 miles west of Kychering (Malbooma), is a point between the former sidings of Barton (96 miles) and Bates (115 miles): Immarna is 127 miles west, and Ooldea 147 miles west, of Malbooma (Luke 1997). The next record of *Amytornis textilis* to the east is from near Pimba RS, north of the Gawler Ranges (Higgins *et al.* 2001), about 277 rail miles or 446 km from Chandler's grasswren locality (see Black and Longmore 2004 for map).

This amended locality of the grasswren records is supported by considering the other species recorded as collected from 110 miles west of Whymbring [Kychering]: Australian Ringneck *Barnardius zonarius,* Mulga Parrot *Psephotus varius,* Splendid Fairy-wren *Malurus splendens,* Variegated Fairy-wren *Malurus lamberti,* Redthroat *Pyrrholaemus brunneus,* Weebill *Smicrornis brevirostris* and Southern Scrub-robin *Drymodes brunneopygia.* This suite of woodland birds cannot be found on the treeless plain (ABB, pers. obs.).

Parker (1972) recorded the habitat from the label of NMV 10002, *viz.* 'shot in mulga and other open scrub, with very little under-growth'. Chandler's slightly more illuminating field notes are cited in full, with ABB's changes in square brackets interpreting misspelling in the original:

> '60 (male) [partly obscured by numbers 105, 106, 107 referring to the previous group of specimens] January 16 1909. Iris brown, bill black, legs black, got in stunted scrub hok [oak *Casuarina* sp.] malger [mulga *Acacia* sp.] beafwood [*sic*] and other scrub [illegible] scattered, 100 and 10 [i.e. 110] miles west from Whymbring Well. Run on the ground much like whip bird, hide in tussic [tussock] of scrub; incrop acacar [corrected] acher seads [acacia seeds] and insects.'

This was Chandler's fullest description of any species in his notebook and the only example with any behavioural observation or crop contents. It seems likely to have been the only species unfamiliar to him. The skins were his only records from this date, a number of skins being recorded from seven days earlier at the same locality. Immediately following R.C. Chandler's meagre and rather cryptic records, on an unknown date, but presumably before 26 March 1909 when the specimens were presented to MV, L.G. Chandler commented in the notebook on certain birds seen and collected by his father on the trip (see Black and Longmore 2004). The first bird discussed was the grasswren, as follows:

> 'Amytis rufous on flanks. Amytis. I saw only two birds on the trip and both were very shy. They were several miles apart and appeared to be solitary birds. Both were in stunted prickly acacia, and not in spinifex where I expected to find them. The nearest spinifex was two or three hundred yards away. In the manner of hopping over the ground and in flight one bird resembled the coach whip bird (*Psophodes crepitans).* Although I paid four visits to the locality where I secured one of the birds I did not get a glimpse of another. The gizzard of one when examined contained small insects and acacia seeds.'

In the biological survey of the Yellabinna region (Copley and Kemper 1992), three of nine major sites studied were within 20 km of Chandler's presumed route (see Discussion below), *viz.* between Ooldea and Bates RS, to the south of Mt Christie RS and north-east of Barton RS ('Lake Bring'). The floristic analysis of that survey statistically identified 12 major plant communities, namely six eucalypt communities, *Stipa/Danthonia* grassland, samphire, *Sclerolaena* herbland, myall *Acacia papyrocarpa* low open woodland, black oak *Casuarina cristata* (now *pauper*) low open woodland and *Acacia ramulosa/Dicrastylis beveridgei* tall open shrubland. This last community was identified at quadrats 9.5 km E of Ooldea and *c.* 20 km NE of Barton, i.e. *c.* 50 km W and *c.* 40 km ENE of the estimated grasswren locality respectively. It could correspond to Chandler's description of grasswren habitat, *Acacia ramulosa* (horse mulga) being the 'mulga' referred to, rather than *Acacia aneura.* On the other hand I think it more likely that the grasswren location lay within the black oak woodland that predominates in most quadrats nearest to the grasswren site, being present at three of eight Ooldea quadrats *c.* 36 km W to 23 km WSW, at all nine Mt Christie quadrats *c.* 80–90 km E to ESE and at six of ten Lake Bring quadrats *c.* 40–65 km ENE from the estimated grasswren location.

Mulga *Acacia aneura* was present at 13 of 18

black oak quadrats and horse mulga at nine. Chenopods present in the understorey included: bladder saltbush *Atriplex vesicaria* (18 of 18), prickly saltwort *Salsola kali* (17), desert goosefoot *Chenopodium desertorum* (14), erect bluebush *Maireana pentatropis* (13), spiny saltbush *Rhagodia spinescens* (13), pearl bluebush *Maireana sedifolia* (11), grey bindyi *Sclerolaena uniflora* (11), mallee bluebush *Maireana trichoptera* (8), fleshy saltbush *Rhagodia crassifolia* (6) and grey bluebush *Maireana radiata* (6). Other trees and shrubs present included several mallee species, e.g. Victoria Desert mallee *Eucalyptus concinna* (13), red mallee *E. oleosa* (11), sugarwood *Myoporum platycarpum* (18), bullock bush *Alectryon oleifolius* (16), quandong *Santalum acuminatum* (16), umbrella wattle *Acacia oswaldii* (17), wait-a-while *A. nyssophylla* (16), pin-bush wattle *A. burkittii* (13), Australian boxthorn *Lycium australe* (16), tar bush *Eremophila glabra* (16), *E. paisleyi* (14), broom emubush *E. scoparia* (9), Mueller's daisy-bush *Olearia muelleri* (16), and flat-stalk senna *Senna artemisioides* ssp. *petiolaris* (formerly *Cassia nemophila* var. *platypoda)* (16) and desert senna *S.a.* ssp. *coriacea* (formerly *C.n.* var. *coriacea)* (15).

In August 2001, Graham Carpenter and colleagues conducted a vegetation survey for the optical fibre telecommunications route, examining a transect about 50 metres on either side of the railway, and estimated that black oak low open woodland, occurring between dunes with sandy loam soils, occasionally with calcareous rubble, accounted for 60% of the habitat between Ooldea and Wynbring (G. Carpenter, pers. comm.). They confirmed the co-occurrence in black oak woodland of other tall shrubs or trees that are dominant in the other vegetation formations, *viz.* sugarwood, mallees, mulga and horse mulga, other acacias and a diverse understorey including chenopods in places. These varied woodlands clearly are subject to much and at times barely definable, merging and admixture along much of this transect through the Yellabinna region (ABB, pers. obs.).

Chandler's original description of habitat included reference to (black) oak, mulga and other stunted and scattered scrub as well as tussocks. To his son he also referred to stunted prickly acacia [perhaps wait-a-while] and specifically to the absence of 'spinifex' *Triodia* spp. The Museum specimens contain reference to 'mulga and other open scrub with very little under-growth' (Parker 1972). These observations seem quite consistent with the nature of black oak low open woodland, which clearly predominates in much of the region of the presumed grasswren locality.

In April 2003, I failed to detect *Amytornis textilis* between Wynbring and Ooldea during ten searches aided by tape-recorded calls of the species.

DISCUSSION

R.C. Chandler's two *Amytornis textilis* specimens were obtained in January 1909 from a little west of the mid-point of the Trans-Australia Railway's transect across the Yellabinna Environmental Association. His field notes suggest that they were taken 110 miles (172 km) west of Whymbring [Kychering], which is correctly interpreted in the MV database as 132 miles (212 km) west of Tarcoola. If his journey followed the railway's surveyed route this would place the locality between the railway sidings of Barton and Bates. While one specimen, AMNH 265213, retains an MV label with the locality stated as 142 miles west of Tarcoola and although Chandler indicated to his son that the two specimens were secured 'several miles apart', it seems unlikely that the second was ten miles further on because of the ten further specimens recorded a week later from '118 miles west of Ooldea' [*sic*; = Kychering – see below]. Only one entry from that latter locality is not fully accounted for: '73 M January 23 1909 Iris brown bill black legs black 118 miles west of Ooldea malley hoke stunted scrub'. This entry was erased by L.G. Chandler who gave the numbers 113 and 114 to the preceding entry and 116 and 117 to the subsequent. In MV is R9169 Rainbow Bee-eater *Merops ornatus*, female, subadult, locality 'Ooldea' with the missing field number 115. Though adult bee-eaters have red irides, juveniles do not and I think it more likely that the unaccounted specimen is that species rather than the second grasswren. The MV database for all of the specimens from that locality (i.e. '118 miles west') records simply 'Ooldea'. It is extremely unlikely that Chandler travelled 118 miles out onto the treeless plain that week. More likely, being close to Ooldea, he erred again and this locality was actually 118 miles west of Kychering. Only one specimen was recorded subsequently, an Australian Owlet-nightjar *Aegotheles cristatus* from twenty miles east of

Ooldea on 1/3/1908 (but corrected to 2/2/09 in the MV database). This seems to have been the only bird collected on the return journey and it too is recorded on the MV database as from Ooldea.

Unfortunately the accuracy of Chandler's estimates of distance cannot be gauged. He did not record, for example, how far he had travelled from Whymbring [Kychering] when he reached Ooldea. His notes and the MV records, however, do indicate the kind of country in which the grasswren specimens were obtained. In particular there were a number of species characteristic of mallee habitats, such as Southern Scrub-robin and Weebill, at the same place and Chestnut Quail-thrush *Cinclosoma castanotus* and Varied Sittella *Daphoenositta chrysoptera* eight miles further west (see Black and Longmore 2004).

The Yellabinna region is a sand-dune landform with a cover of mixed black oak, eucalypt and acacia woodlands, and is a south-easterly extension of the Great Victoria Desert (GVD) (Laut *et al.* 1977). These habitats have been shown to provide a connecting corridor for a number of southern bird species that occur on either side of the Nullarbor Plain (Ford 1971; Black and Badman 1986). Because the habitat and environment seem at odds with what is generally known about *Amytornis textilis*, and for other reasons as discussed, Chandler's record has remained an enigma. I travelled through Barton and Immarna twice previously, in August 1980 and August 1983, on the latter occasion with other ornithologists including Lynn Pedler, Chris Baxter and Julian Reid. I assumed the locality (Immarna, or *c.* 132 miles west of Tarcoola) was an error and the true collection location may have been north-west of Tarcoola. For this reason *Amytornis textilis* was not included in the birds listed for the eastern GVD (Black and Badman 1986) or the biological survey of the Yellabinna region (Copley and Kemper 1992).

As pastoral properties north-west of Tarcoola were not developed from Crown land until the late 1920s (H. MacLachan, pers. comm.), it is unlikely that Chandler's journey was in that direction. The most westerly pastoral property at that time was Wilgena, established in 1877 (M. McBride, pers. comm.). Wilgena Homestead is about eight miles (13 km) east of Tarcoola and is in Chandler's notes as Wolgena. The South Australian section of the Trans-Australia Railway was surveyed by 19 March 1909 and the entire railway was built by 17 October 1917 (Luke 1997). The MV database and Chandler's notes are consistent with a collecting journey along the surveyed route of the future railway from Port Augusta to Ooldea. The only established place names would have been those applying to important Aboriginal sites, especially water sources, which were of interest to the railway surveyors, notably Kychering and Wynbring. Chandler's notes indicated the taking, and presumably preparing, of 18 bird specimens on 22 November 1908 and 29 on 11 December 1908, and incongruously from several places up to 20 miles apart on the same day. Perhaps these dates indicate when he wrote his notes. It is clear nonetheless that he collected extensively on either side of Kychering from some time before 22 November 1908 to 18 December 1908, and then moved 110 miles west, the next record being three weeks later on 9 January 1909. A fortnight later he was eight miles further west and a week later he apparently had reached Ooldea and was on the return journey, 20 miles east of Ooldea.

Barton Sandhills (Yellabinna region) not a barrier to *Amytornis textilis*

The name Yellabinna (or Jellabinna) has come into general use only recently, i.e. since Laut *et al.* (1977), Lesslie and Taylor (1983) and, particularly, Copley and Kemper (1992). White (1919) referred to 'the great sandhills' and Ford (1971) discussed the region as an integral part of the Great Victoria Desert, though he marked it 'mallee dunes', i.e. as a distinct entity on his map. Railway workers, on the other hand, have had a continuing respect for these highest dunes and the part of the Trans-Australia railway that needed most design and engineering and which has the greatest potential for disaster. This is the most elevated section through Barton and Immarna, before the railway begins its steady descent to the plain near Ooldea. They have known it universally as the Barton Sandhills (Monty Luke, pers. comm.). From the 1970s this name began to be applied in the ornithological literature to the whole Yellabinna region (Ford 1973; Parker *et al.* 1979; Schodde 1982b; Black and Badman 1986; Ford 1987). The Barton Sandhills are marked on maps in Parker *et al.* (1979), Ford (1987) and Schodde and Mason (1999) and are in this context synonymous with the Yellabinna region as noted by Robinson, Casperson and Copley (1990). The State's

Geographical Names Advisory Committee does not recognise the name Barton Sandhills but, on the submission of geologist M.C. Benbow, formally adopted names for the Ooldea, Paling and Barton Ranges in 1988 (Bill Watts, pers. comm.). These three ranges are the highest topographical features within the Yellabinna region and are of much greater geological age than the surface dunes themselves (Benbow 1992).

Schodde (1982a) commented that the connection between *Amytornis textilis* in WA and on Eyre Peninsula is paralleled by the Rufous Treecreeper *Climacteris rufa* and Blue-breasted Fairy-wren *Malurus pulcherrimus* that 'seem to have filtered...along corridors of sandy mallee that once skirted the Nullarbor Plains'. He added, in contrast the grasswrens 'live only in shrub steppe on hard pan soils', habitat that is present in 'the Nullarbor though the birds are missing from it.'

Ford (1971) provided a more comprehensive list of birds that extend through the GVD (including Yellabinna) from Western Australia and Eyre Peninsula, and he and Black and Badman (1986) listed others that are present on either side of the GVD but extend only marginally into the GVD in the west or Yellabinna region in the east. All of these species generally occupy eucalypt and mainly mallee communities and are therefore absent from the Nullarbor Plain.

Schodde (1982b) commented on the only slight variation between populations of the 'Western' Grasswren (i.e. *textilis* and *myall*) in strong contrast with the marked differences between the Cinnamon Quail-thrushes *Cinclosoma cinnamomeum* of the Nullarbor Plain and Lake Eyre basin which **'are separated by the same dune systems'** (i.e. the dunes of 'the GVD through Barton to the top of Eyre Peninsula'). Ford (1987) also listed both *textilis* and *modestus* as taxa requiring hard pan (and sand in the former) as substrate and **with sand dunes a barrier.** Taxa that Ford showed were present on the Nullarbor Plain but with the Barton Sandhills as a barrier included the Blue Bonnet *Northiella haematogaster* and Cinnamon Quail-thrush, and (without subspecific differentiation) Inland Dotterel *Charadrius australis*, Slender-billed Thornbill *Acanthiza iredalei* and Rufous Fieldwren *Calamanthus campestris*.

Amytornis textilis was not recorded in the biological survey of the Yellabinna region (Copley and Kemper 1992) and, assuming its absence, Cohen, Reid and Casperson (1992) concluded as had earlier reviewers cited above that this **'minor but significant avian barrier,** which has led to incipient speciation in the' Cinnamon Quail-thrushes and Bluebonnets, has led also **'to subspecific divergence in the Thick-billed Grasswrens'.** However, clearly this species was present in the Yellabinna region which is therefore not a barrier; and if any barrier does or did exist it may be the GVD. A number of other species that occur in southern WA and Eyre Peninsula have been recorded in the Yellabinna region but not throughout the GVD. These are the Shy Heathwren *Hylacola cauta*, Red Wattlebird *Anthochaera carunculata*, White-eared *Lichenostomus leucotis*, Purple-gaped *L. cratitius*, Yellow-plumed *L. ornatus*, and Brown-headed *Melithreptus brevirostris* Honeyeaters, Western Yellow Robin *Eopsaltria griseogularis*, Southern Scrub-Robin, Golden Whistler *Pachycephala pectoralis* and Dusky Woodswallow *Artamus cyanopterus* (Ford 1971; Black and Badman 1986; Cohen *et al.* 1992). The western forms of *Amytornis textilis* are thus linked with a suite of eucalypt-dependent birds that are not typical arid-zone species. This is not to state that the grasswrens are eucalypt-dependent or absent from the arid zone, but to note that they occupy a wider range of habitats than other grasswrens including the eastern form *A.t. modestus*. The parallel between the distributions of the western *Amytornis textilis* and other generally eucalypt-dependent species partly resolves the anomaly of the presence of *A. textilis* in the inter-dune woodlands of the Yellabinna region.

Absence from the Nullarbor Plain?

Another anomaly in the distribution of *Amytornis textilis* is its presumed absence from the Nullarbor Plain. While this is accepted as fact by most authorities (Schodde 1982a; Higgins *et al.* 2001), ambiguity is shown by Schodde and Mason (1999) in their map as well as the habitat summary, and Ford (1987) and Rowley and Russell (1997) allow an interpretation of its recent presence. The historical record on this point is inconclusive.

Early explorers and surveyors of the Nullarbor Plain, such as R.T. Maurice, provided only superficial reports of its avifauna (Cleland 1942). C.G. Gibson, assistant WA Government Geologist, who examined the area between Kalgoorlie and Eucla between September and November

1908 during the survey of the Trans-Australia Railway published the first bird list for the Nullarbor Plain (Gibson 1909). This was just a decade after rabbits arrived on the Plain and had begun to impact significantly the habitat and avifauna of the region (Ford 1987). Gibson described four major habitats (salmon gum/gimlet woodland, mallee/spinifex, casuarina/myall/mulga, and treeless plain) and claimed to have recorded the Long-tailed Grasswren *Amytis macrura* (= *A. macrourus,* syn. of *Amytornis t. textilis)* as 'odd ones here and there right through, chiefly among the blue bush'. He also referred to an unidentified grasswren specimen, 'probably *A. textilis',* from near Kalgoorlie. He subsequently found nests and eggs of *A. textilis* near Kalgoorlie (North 1910) but did not clearly indicate how far further east grasswrens were found and whether on the treeless plain, in particular. Gibson provided a good record of the resident birds of the treeless plain, recording the Rufous Fieldwren, the species most likely to be mistaken for a grasswren, and also the Slender-billed Thornbill and Cinnamon Quail-thrush. As his precise route was not stated, the implied presence of grasswrens on the treeless plain is inconclusive, 'blue bush' being present throughout his journey. Tantalisingly, Gibson suggested two forms of grasswren, that from near Kalgoorlie being considered different.

S.A. White (1919) made four trips on the railway to Tarcoola and Ooldea from January 1917 to May 1918 but, despite the title of his paper '*...to the Nullabor [sic] Plains',* apparently spent relatively little time on the treeless plain. He did not record a grasswren, quail-thrush or fieldwren, though he did see the Slender-billed Thornbill. Whitlock (1922), an outstanding field worker and collector for H.L. White, spent several months at Zanthus, Naretha and Haig, WA (i.e. in the mallee, myall and treeless plain habitats, respectively) but did not record *Amytornis textilis,* a bird with which he had become familiar at several localities, e.g. Shark Bay, Lake Austin and Lake Way (Wiluna), recording the nest and eggs at the last locality (Whitlock 1910, 1921). The bird notes from the Nullarbor Plain of Le Souëf (1928) at Rawlinna, WA, McGilp (1932) in the south-east and Ford and Sedgwick (1967) north of Rawlinna are all clearly incomplete and the absence of grasswrens from these publications is therefore not especially revealing. Collins (1943) gave a more complete list from a presumably more extended period of observations near Haig, but a grasswren was not included. Brooker *et al.* (1979) recorded all bird observations during 1967–1978 in an ecological study of the Wedge-tailed Eagle *Aquila audax* on the north-western Nullarbor Plain north of Naretha, Rawlinna and Haig, without identifying a grasswren.

Clearly a grasswren was once present in view of skeletal material consistent with that of *Amytornis textilis* found in Nullarbor Plain cave material (Baird 1990). In addition there have been a number of recent reports. Burbidge, Casperson and Fuller (1987) were confident of the presence of the species during the biological survey of the Nullarbor region in 1984. It was reported as common at all Haig quadrats (*c.* 100 km E of Rawlinna) in April 1984 but was absent in September of that year. It was also recorded at the 'Catacombs' site *c.* 35 km NW of Nullarbor Hotel/Motel, SA by Bernice Cohen on 21 September 1984 (A.C. Robinson, pers. comm.), but no specimen or field notes were taken. I have spoken to four of the five observers responsible for the preceding records, but unfortunately there is insufficient retained information to confirm identification.

The most recent report is that of Ken Harris (Harris and Living 2000) from north of Watson, SA on 26 July 2000. Two birds were seen and one 'sat on top of a blue bush in full sun'. Another two were glimpsed between Watson and Ooldea just before dusk on the same day. Harris provided the following description to Birds Australia:

> 'two wren like birds: (one) bird scuttled from Bluebush to Bluebush rapidly: bulkier, longer in tail and much browner than WW Fairywren:...general colour darkish brown...eventually bird appeared at top of a Bluebush and stood motionless for 5–10 seconds, looking directly at me...strongly marked all down front: mid to dark brown vertical markings interspersed with finer white lines. Bill was broad (from front on) and dark'.

Also seen in the area were White-winged Fairy-wrens *Malurus leucopterus,* Rufous Fieldwrens and Richard's Pipits *Anthus novaeseelandiae.* This account does not entirely exclude Rufous Fieldwren, the broad bill and markings described being a little suggestive of that species.

In contrast to the above records is the recent experience of ornithologists familiar with grass-wrens. Lynn Pedler, Jamie Matthew and Graham Carpenter each spent one to three weeks studying

Nullarbor birds without recording a grasswren (pers. comms to ABB). During April 2003, I examined the three sites identified by Cohen and Harris, assisted by taped calls of the species, without success.

Taxonomy

While the subspecies *A.t. textilis*, *A.t. myall*, and *A.t. modestus* have all been considered birds of arid or semi-arid chenopod shrublands, this is clearly a simplification. Only the eastern *A.t. modestus* is confined to such habitat entirely within the arid (120–200 mm mean annual rainfall) blue-bush/saltbush plains of the south-central Australian lakes-drainage. Its former range in central, northern and western NSW was in a semi-arid region of higher rainfall (to perhaps 400 mm or more annually, mainly as summer rainfall) but it evidently occupied habitats typical of more arid areas, *viz.* low shrubs such as nitre-bush *Nitraria billardierei* or saltbush *Atriplex* spp., *Rhagodia* spp. (Parker 1972) or dry stony bluebush country (McAllan 2000).

Before the early twentieth century, in contrast, *A.t. textilis* occurred west and south from Kalgoorlie into many places that are far from arid, including the higher rainfall western and southern wheatbelt such as: Wongan Hills, about 200 km NE of Perth; Beverley, about 140 km E of Perth; Broomehill, about 150 km N of Albany; and near Esperance (Schodde 1982a). *Amytornis t. myall*, though largely dependent on an open chenopod understorey, is also found in open western myall *Acacia papyrocarpa* and other semi-arid woodlands and shrublands (Parker 1972; Higgins *et al.* 2001) and exceptionally on a triodia and acacia-covered hillside (L. Pedler, pers. comm.).

In its former extensive range the western form *A.t. textilis* occupied various habitats, mostly within the annual rainfall range of 250–500 mm, or more, e.g. '22 inches' [550 mm] at Broomehill (Carter 1908). *Amytornis t. textilis* apparently now survives only in the Shark Bay region at the most north-westerly part of its recognised range where the annual rainfall is around 225 mm (Brooker 2000). Shark Bay also defines the geographical limits of a number of bird species characteristic of eucalypt woodlands and shrublands, e.g. Blue-breasted Fairy-wren, Southern Emu-wren *Stipiturus malachurus*, Red Wattlebird, Yellow-plumed and Brown-headed Honeyeaters, Western Yellow Robin and Southern-Scrub-robin. Inland from Shark Bay, e.g. at Lakes Way and Austin, *A.t. textilis* occupied what we would now consider its typical saltbush habitat (Whitlock 1910), but further south it clearly extended throughout a vast area of eucalypt woodlands and mallee. Carter (1908) obtained the species in marlock (or maalok), a mallee thicket that was in flower at the time and attracting Brown-headed Honeyeaters and Red Wattlebirds. He subsequently obtained specimens of Blue-breasted Fairy-wren and Southern Emu-wren from marlock thickets. Crossman (1909) (and his spaniel) obtained a specimen of *A.t. textilis* between Beverley and Cumminin Station 90 miles to the east. He did not describe the habitat at the locality but outlined the vegetation at Cumminin, *viz.* jam-wood *Acacia acuminata* and York gum *Eucalyptus loxophleba* on the hills, salmon gum *E. salmonophloia*, gimlet *E. salubris* and morell *E.* sp. in the valleys and 'vast sand plains covered with practically impenetrable scrub'. Crossman's bird list is a typical mallee assemblage.

Gibson sent skins, three sets of eggs, the first photograph of a nest, and field notes to A.J. North (1910) after observing *Amytornis textilis* near Kalgoorlie and Leonora, WA. He found nine nests which he stated were 'usually placed in the centre of a low thick bush', one being described as a thick prickly bush. The habitat seems likely within eucalypt woodland, but was not described fully and cannot be confirmed. A 'clump of thick bush', 'a similar clump of brush' and 'thick brush thickets' are the descriptions provided for where he found *Amytornis textilis* near Kalgoorlie. Wongan Hills, where John Gilbert collected the type specimens of *Amytis macrourus* for John Gould, is where Gilbert gave an early and detailed account of the incubator mound of the Malleefowl *Leipoa ocellata* (Whittell 1954) and took the type specimens of the Blue-breasted Fairy-wren (Gould 1844). These two species indicate the presence of eucalypt woodlands or shrublands at Wongan Hills where *A. textilis textilis* occurred at that time.

The ranges of the western subspecies *A.t. textilis* and *A.t. myall* in WA eucalypt communities and the Yellabinna sand dune system, respectively, that broadly follow a suite of eucalypt-dependent bird species starkly contrast with the arid zone range of *A.t. modestus* and associated arid avifauna such as the Inland Dotterel, Chestnut-breasted Whiteface *Aphelocephala pectoralis*, Gibberbird *Ashbyia lovensis* and Cinnamon Quail-thrush.

Schodde (1982a) offered a minor criticism of Parker's (1972) landmark review of related grasswrens, namely, 'its dismissal of real differences between eastern and western Thick-billeds found by previous ornithologists'. In his major review of arid zone birds in the same year Schodde (1982b) listed two species, *viz.* 'Western' Grass-wren *A. textilis,* including *A. textilis myall* and the monotypic Thick-billed Grasswren *A. modestus.* Schodde's (1982a) reluctance to separate *textilis* and *modestus* was influenced by the view that their differences were not substantially greater than those between the Dusky Grasswren *A. purnelli* and 'Kalkadoon' Grasswren *A. ballarae,* then treated as a single species, or between the Striated *A. striatus* and Short-tailed *A. merrotsyi* Grasswrens also then treated as a single species. Schodde and Mason (1999) separated the above two species-pairs but retained *textilis* and *modestus* as a single species albeit reluctantly it seems. Higgins, Peter and Steele (2001) also combined the two related taxa but stated, 'there may be a case for treating [*modestus*] as a full species in view of: (1) substantial morphological differences from other subspecies; (2) relatively large genetic distance from *myall* (Christidis 1999), which was nevertheless identified as a sister taxon; (3) biogeography (*modestus* appears isolated from other races by the Eyrean Gap, a barrier involved in speciation in other bird groups, e.g. wedgebills *Psophodes*; and (4) possible differences in calls'.

The morphological differences are shown in Tables 1 and 2: *modestus* is clearly distinct in being smaller; much paler above and below; less strikingly streaked, especially on the underparts; with a more curved and 'thicker' bill; and with a distinctly shorter tail of equal length in each sex. Chapman (1996) considered the calls of *modestus* to be higher pitched and less musical. The Western Australian form *textilis* is characterised by quite exceptional tail length, particularly in males; its appearance varies greatly in different localities and it was given various specific or subspecific names (see Parker 1972; Schodde 1982a; Rowley and Russell 1997). This variation in *textilis* is discussed by Higgins *et al.* (2001) without consideration of possible additional subspecies. Schodde and Mason (1999), moreover, suggested that *myall* might be included in *textilis* without subspecific distinction, particularly if these are shown to be in contact. The form *myall,* which includes Chandler's specimens, however, has rather consistent plumage and morphology, including bill-shape, and its tail is certainly shorter than that of *textilis*; its subspecific status therefore seems justified at present.

Only limited genetic data are published for the taxa under consideration. Christidis (1999) undertook an allozyme analysis of seven of the eight then recognised Grasswren species: the Eyrean *Amytornis goyderi,* Dusky *A. purnelli purnelli,* Thick-billed *A. textilis modestus* and *A.t. myall,* Black *A. housei,* White-throated *A. woodwardi,* Striated *A. striatus striatus* and *A.s. merrotsyi,* and Grey *A. barbatus barbatus* and *A.b. diamantina.* He found that *A.s. merrotsyi* showed substantial genetic divergence from *A.s. striatus* and concluded it was specifically distinct. Though *A. textilis myall* and *A.t. modestus* were considered sister taxa, the separation was at a level similar to that separating either from *A. purnelli* or *A. goyderi.* In this study, however, the relatively little allozyme variation within the whole group (*modestus-myall-purnelli-goyderi*) precluded any conclusion that *modestus* and *myall* were separate species.

Subsequent DNA sequencing studies (L. Christidis, pers. comm.) of most of the recognisably distinct grasswren taxa (though not including *A.t. textilis)* have shown that the genetic separation between *modestus* and *myall* is at the low end for the species level recognition but at the high end for subspecies recognition.

Condon (1962; 1968-69) listed all three grasswren taxa, *textilis, myall* and *modestus* for South Australia. Parker (1972) pointed out that Condon did not realise that specimens supposedly from Tarcoola, Ooldea and Immarna were of only two birds from the same locality (the subject of this paper). I conclude that these two birds belong to the subspecies *A.t. myall,* and that *A.t. textilis* does not occur in SA. Presumably the error discussed here is responsible for the continuing inclusion of *A.t. textilis* in the *List of Vertebrates of South Australia* (Robinson, Hutchinson and Casperson 2000) and other official documents such as the provisionally amended schedules of the SA *National Parks and Wildlife Act, 1972.*

The dramatic decline in western (*A.t. textilis/ A.t. myall)* and eastern (*A.t. modestus*) populations, the former throughout most of its range, the latter mainly from its periphery, makes it unlikely to elucidate fully the geographic variation and relationships of the three taxa. However, the parapatric (abutting but non-overlapping) taxa

myall and *modestus* are consistently distinct morphologically. There are also differences in habitat and biogeography between western and eastern groups as well as genetic and possible vocal differences. The evidence argues for recognition of two species, the Western Grasswren *A. textilis* with two subspecies, and the Thick-billed Grasswren *A. modestus*.

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