

V REPTILES AND FROGS OF EAST YUNA AND BINDOO HILL NATURE RESERVES

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INTRODUCTION

The Yuna area is important because two major geological formations are exposed on the surface — Tumblagooda Sandstone of Silurian origin and Nangetty Formation of Permian origin (see Dell, Introduction this report). The Tumblagooda sandstones upon which lies Bindoo Hill Nature Reserve are an isolated exposure surrounded by more recent Permian sediments of tillite, shale, tillitic sandstone and conglomerate upon which East Yuna Nature Reserve is situated. Important also is the fact that most of the wheat-belt is different geologically from the Yuna area and consists of granites and granitic gneisses of Pre-cambrian origin. Consequently it is likely to have a herpetofauna different from that at Yuna. Notwithstanding the zoogeographic importance of the area, little was known of its biota until the biological survey which resulted in this paper.

Reptiles and frogs were collected on East Yuna Nature Reserve (No. C28415 and C29231) and Bindoo Hill Nature Reserve (C30844) during 7-18 May 1973, 18-30 September 1973 and 12-18 October 1976. For location and size of reserves see Dell (this report).

The annotated list includes those specimens collected during the above dates as well as a few collected by T. Evans during firebreak construction in February 1975. Specimens are registered R47736-41, 48184-48290, 49906-7, 49911-28 and 56996-57013 and are in the Western Australian Museum. All specimens were examined for reproductive data. Measurements are in millimetres. Vegetation location numbers are referable to Muir (this publication).

ANNOTATED LIST

LEPTODACTYLIDAE

Heleioporus albopunctatus. EYR. Four collected in May from clay soil along Wandin Creek.

Pseudophryne guentheri. BHR. Two collected in May from stony creek-bed on BHR Water Reserve (see Fig. 1, Introduction, this report).

GEKKONIDAE

Crenadactylus ocellatus. EYR. Ten collected in May and 3 in September under *Plectrachne danthonioides*. A juvenile (SVL 21) collected in May.

Males (SVL 30-32) had similar size testes (ca 2 mm) in May and September. A May female (SVL 33) had a large flat oviduct; presumably it bred the previous season.

Diplodactylus alboguttatus. EYR and BHR. Four collected in May and 1 in September from EYR, and 8 in September from BHR. All specimens were active at night on yellow sand. Males (SVL 46.5-50.5) collected in May and September had approximately the same size testes (3-5.5 mm). A male (testes 4 mm) collected 27 September had a firm grip on a female and may have been attempting copulation. Comments on zoogeography are included in the discussion in this paper.

Diplodactylus granariensis. EYR. One collected in May and 2 in September. At night on yellow loamy sand in shrubland and whitish loamy sand in mallee. The May specimen was juvenile; a September male (SVL 51) had enlarged testes, 5 mm long; and a September female (SVL 60.5) had small ovarian follicles, 2 mm long.

Diplodactylus michaelsoni. EYR. One collected in September under roadside spoil on yellow sand in loc. 3.20, and 1 in February by T. Evans.

Diplodactylus ornatus. EYR and BHR. Five collected in May, 3 in September and 1 in February from EYR; 1 in May and 1 in September from BHR. Widespread on yellow sandplain, also on whitish loamy sand in mallee at EYR; on sandplain at BHR. May males (SVL 42-52) had testes 3-4 mm long compared to September males (SVL 51-56) with testes 5-6 mm long. The only female was collected in May; it had SVL 51.5 and ovarian follicles of 1.5 mm.

Diplodactylus pulcher. EYR and BHR. Two collected in May from EYR and 1 in September from BHR. The BHR specimen was on yellow sand and the EYR specimens under rocks at top of breakaway and on red sand. One September and 1 May specimen were females (SVL 38, 58) with ovarian follicles less than 2 mm.

Diplodactylus spinigerus. BHR. One collected in September 1.1 m above ground on shrub on yellow loamy sand. It was male (SVL 53) and had enlarged testes (5.5 mm).

Gehrya variegata. EYR and BHR Water Reserve. Twelve collected in May and 8 in September from EYR; 5 in May and 2 in September from BHR. In dead trees, fallen logs, under roadside spoil and in *Plectrachne danthonioides* clumps. Two juveniles (SVL 26.5, 27) collected in May and 2 (SVL 28, 29.5) in September. Males (SVL 42-46) collected in May had testes 3-5 mm long compared to 4-5.5 mm for September males (SVL 41-45).

Heteronotia binoei. EYR and BHR. Eight in May and 8 in September from EYR; 1 in May from BHR. Under rocks on breakaways, under roadside litter and in *Plectrachne danthonioides*. Two juveniles (SVL 22) collected in May. A September male (SVL 46) had testes 2.5 mm compared to 3.5 mm for a May male (SVL 47). September females (SVL 49-50) had slightly enlarged ovarian follicles 2.5 mm long.

Nephrurus levis occidentalis. EYR and BHR. Four collected in May, 1 in September and 5 in October from EYR; 3 in September from BHR. On yellow or whitish loamy sand at night. This gecko was very common along tracks on sand in EYR loc. 3.21 and BHR loc. 3.1 at night after rain on 17 and 18 October. A September male (SVL 50.5) had testes 3.5 mm long whereas 5 October males (SVL 46-69) had testes ranging from 4 mm in the smallest specimen to 8 mm in the largest.

Rhynchoedura ornata. EYR. One collected by T. Evans in February 1975.

PYGOPODIDAE

Delma australis. EYR. Three collected under *Plectrachne danthonioides* in May.

Delma nasuta. EYR. Two collected in May and 4 in September. Under *Plectrachne danthonioides* and roadside spoil on sandy loam. September males (SVL 81, 82) had enlarged testes 7-9 mm long. A September female (SVL 82) had ovarian follicles 3 mm long compared to 2 mm in May (SVL 85, 90).

Lialis burtonis. EYR. Two collected in May under *Plectrachne danthonioides*.

Pygopus lepidopodus. EYR and BHR. Two collected while active on yellow sand in shrubland EYR loc. 3.21 and 3.15 in October; one collected among litter at BHR in May.

AGAMIDAE

Amphibolurus inermis. BHR. One collected in May and 1 in October. Shrubland on yellow sand. The October female (SVL 80) was close to breeding, it had ovarian follicles 4 mm long. Its stomach contained remains of Coleoptera (Scarabaeoidea).

Amphibolurus maculatus maculatus. EYR and BHR. One collected in May, 2 in September and 5 in October from EYR; 7 in May, 20 in September and 1 in October from BHR. Shrubland and heath on yellow or white sand.

September and October males (SVL 47-56) had enlarged testes 4-7.5 mm long compared to 2.5-3 mm in May (SVL 39-43). September females (SVL 47-63) had ovarian follicles greater than 2 mm or were gravid. Three females collected on 27 September had the following eggs: (a) 1 in left oviduct, 1 in right, (b) 2 in right oviduct, (c) 2 in right oviduct. Eggs ranged between 6.5 mm and 12 mm long. One October female (SVL 51) had a yolky follicle 6 mm long in each ovary and 2-3 small follicles 1.5 mm long. Three other females (SVL 50-51) had follicles 0.8 mm. One of these specimens had distended oviducts possibly indicating recent egg-laying; the others had thread-like oviducts. Possibly only some females were breeding in 1976 during drought (see climate, Introduction this report) or were summer breeders not yet in breeding condition. *A. m. maculatus* is an annual, the maximum age being about 18 months (Storr 1965).

Amphibolurus minor. EYR. Two collected in September. Mallee and shrubland on red loamy soil. They were female (SVL 96, 103); 1 had 9 eggs between 5-22 mm long (specimen damaged, left or right oviducts indeterminate), the other 8 eggs up to 20 mm long (3 in left oviduct, 5 in right).

Amphibolurus reticulatus. EYR. Male (SVL 80) with large testes 10.5 mm long collected from burrow under slab of rock at base of breakaway in September.

Amphibolurus scutulatus. EYR and BHR. One collected among *Plectrachne danthonioides* in EYR in September; 1 in shrubland loc. 3.21 in October; 1 collected on BHR by T. Evans in February. October female (SVL 50) had 6 follicles 0.8 mm in each ovary.

Lophognathus longirostris. EYR. Two collected among *Eucalyptus camaldulensis* along banks of Noondamurra Pool. A female (SVL 69) had developing ovarian follicles, the largest 3 mm long on 16 October 1976.

Moloch horridus. EYR and BHR. Two collected in September from EYR; 1 in September and 1 in February from BHR. One September female (SVL 75) had developing ovarian follicles 4 mm long, a male (SVL 73) had enlarged testes 7 mm long.

SCINCIDAE

Cryptoblepharus carnabyi. EYR and BHR. Four collected in May and 1 in September from EYR; 1 in May from BHR. In dead trees, fallen logs and among rocks on breakaway slopes.

Ctenotus alleni. EYR. Two collected in May, 3 in September and 4 in October. Widespread: in *Plectrachne danthonioides* under mallee EYR loc.

2.5, shrubland EYR loc. 3.15 and 3.21 and heath EYR loc. 4.4 and 4.6. A September male had medium size testes 5 mm long. A September female (SVL 87) had small ovarian follicles, the largest 2 mm; this was the same size as a female (SVL 91) collected in May. An October male (SVL 82) had large testes 9 mm long. An October female (SVL 86) had ovarian follicles 2.5 mm long compared to another (SVL 89) with yolky follicles 4 mm long.

Ctenotus mimetes. EYR and BHR. One collected in September and 1 in February from EYR; 2 in September from BHR. One from EYR was from a rocky sandstone ridge, those from BHR were in *Acacia* scrub. One September female (SVL 80) was gravid with 6 eggs, the largest 5 mm, in one oviduct; another female (SVL 72) had developing ovarian follicles 2.5 mm long. Like other large arid-country *Ctenotus*, e.g. *C. leonhardii* and *C. pantherinus ocellifer* (Pianka 1969), this species is quite fecund.

Egernia inornata. EYR. One dug from burrow in red sandy loam in mallee EYR loc. 2.11 in September.

Menetia greyii. EYR. One collected in May and 1 in September. Under *Plectrachne danthonioides* and litter on sandy loam.

Menetia surda. EYR and BHR. Five collected in May and 5 in September from EYR; 2 collected in May from BHR. Those at EYR were under *Plectrachne danthonioides*. This is the southernmost known locality for an arid-country species whose distribution may be related to the presence of *Plectrachne danthonioides*.

Morethia butleri. EYR and BHR. One collected in May and 3 in September from EYR; 1 in May from BHR. Among litter at base of mallee trees, on rocky hillsides and under sandstone slabs at base of breakaway. Three September males (SVL 48) had enlarged testes 5-7 mm long.

Morethia lineoocellata. EYR. One collected in May.

Morethia obscura. EYR and BHR. One collected under mallee in EYR loc. 2.11 in September, 1 in October in shrubland on yellow sand EYR loc. 3.21 and 2 juveniles in May from BHR.

Omolepida branchialis. EYR. One under *Plectrachne danthonioides* in EYR loc. 2.5 in May; 1 under roadside spoil in mallee in September; 1 active in daytime in shrubland EYR loc. 3.21 near top of breakaway where there were surface sandstone fragments. A male (SVL 71) collected in September had testes 2.5 mm compared to 8 mm in an October specimen (SVL 95).

Tiliqua occipitalis. EYR. One collected in May and 1 in September. Mallee with *Plectrachne danthonioides*. A September male (SVL 240) had large testes 22 mm long.

Tiliqua rugosa. EYR. One collected in September on stony hill among *Eucalyptus loxophleba* trees. It was a male (SVL 240) with testes 15 mm long.

VARANIDAE

Varanus eremius. EYR. One collected in September in *Plectrachne danthonioides* in loc. 2.8.

ELAPIDAE

Pseudonaja modesta. BHR. One collected in May in shrubland on yellow sand.

Pseudonaja nuchalis. Several have been collected in farmland near EYR by D.J. McGauran.

Pseudechis australis. EYR. One seen but not collected in September in loc. 3.2.

DISCUSSION

Thirty-seven reptile and 2 frog species are recorded from the East Yuna and Bindoo Hill Nature Reserves; an additional snake has been collected nearby. This total is comparable to the 40 reptiles collected on Cockleshell Gully Reserve (Dell & Chapman 1977) and the 45 species recorded at Kalbarri National Park (Storr, unpublished data). East Yuna and Bindoo Hill Reserves are considerably richer than reserves elsewhere in the wheatbelt. The Tarin Rock Reserves have 23 species (Smith & Chapman 1976), Bending Reserves have 29 species (Chapman & Dell 1977) and Dongolocking Reserve has 23 species (Chapman & Dell 1978).

The richness of the herpetofauna of East Yuna-Bindoo Hill is due to two faunas, the south-western and eremaeian, coming into contact. The area is close to the major vegetation boundary, the mulga-eucalypt line, which separates these two zoogeographic regions. Geological factors too, are partly responsible for the rich herpetofauna. Tumblagooda Sandstones and Nangetty Formations, which are typical of the sub-surface geology of the Murchison area, outcrop at East Yuna and Bindoo Hill.

The Nangetty Formation, and its recent alluvial deposits, in particular is important for reptiles, twenty-four species being recorded. Table 1 lists the three main geological types and the reptiles that were recorded on them. The 'spinifex', *Plectrachne danthonioides*, grows abundantly on loams derived from the Nangetty Formation. Many reptiles were collected under this *Plectrachne* which was not recorded on quartz sands or Tumblagooda Sandstones.

TABLE 1
Reptiles of East Yuna and Bindoo Hill Nature Reserves
showing occurrence on the three geological types.

	EYR			BHR		
	Nangetty	Tumblagooda	Quartz Sand	Nangetty	Tumblagooda	Quartz Sand
<i>Crenadactylus ocellatus</i>	X					
<i>Diplodactylus alboguttatus</i>			X			X
<i>D. michaelsoni</i>			X			
<i>D. pulcher</i>	X		X			X
<i>D. spinigerus</i>						X
<i>D. granariensis</i>	X		X			
<i>D. ornatus</i>	X		X			X
<i>Gehyra variegata</i>	X			X		
<i>Heteronotia binoei</i>	X			X		
<i>Nephrurus levis</i>			X			X
<i>Rhynchoedura ornata</i>		habitat	not known			
<i>Delma australis</i>	X					
<i>D. nasuta</i>	X					
<i>Lialis burtonis</i>	X					
<i>Pygopus lepidopodus</i>	X		X			X
<i>Amphibolurus inermis</i>						X
<i>A. m. maculatus</i>			X			X
<i>A. minor</i>	X					
<i>A. reticulatus</i>	X					
<i>A. scutulatus</i>	X			habitat	not known	
<i>Lophognathus longirostris</i>		X				
<i>Moloch horridus</i>			X			X
<i>Cryptoblepharus carnabyi</i>	X			X		
<i>Ctenotus alleni</i>	X		X			
<i>C. mimetes</i>	X			X		
<i>Egernia inornata</i>	X					
<i>Menetia greyii</i>	X					
<i>M. surda</i>	X			X		
<i>Morethia butleri</i>	X			X		
<i>M. lineocellata</i>			X			X
<i>M. obscura</i>	X		X			X
<i>Omolepida branchialis</i>	X					
<i>Tiliqua occipitalis</i>	X					
<i>T. rugosa</i>	X					
<i>Varanus eremius</i>	X					
<i>Pseudonaja modesta</i>	X					X
<i>Pseudechis australis</i>			X			

East Yuna and Bindoo Hill Reserves combined are nowhere near as rich in reptiles as the Shark Bay area where 94 species and subspecies are recorded (Storr & Harold 1978). Shark Bay is especially rich because in addition

to the south-western and eremaeian faunas, it has numerous elements of the northern fauna including marine species. This is in contradistinction to East Yuna where only *Lophognathus longirostris* is representative of the northern fauna.

Other species are known from the region but have not been recorded from either East Yuna or Bindoo Hill Reserves. *Caimanops amphiboluroides* has been recorded east of the mulga-eucalypt line at Gullewa, *Amphibolurus a. adalaidensis* in coastal sands of Kalbarri National Park, *Cryptoblepharus plagiocephalus* ca 15 km south-west of Bindoo Hill Reserve, *Egernia stokesii badia* at Mullewa, *Ctenotus schomburgkii* and *Lerista macropisthopus* further west at Galena and Ajana respectively, *Demansia r. reticulata* at Yuna, *Vermicella s. semifasciata* further west at East Chapman, *V. f. fasciolata* ca 35 km to the north-east and at Carnamah to the south, and *Pseudonaja nuchalis* ca 1 km west of East Yuna Reserve.

The specimens of *Diplodactylus alboguttatus* are the most easterly known; and *Rhynchoedura ornata*, *Nephrurus levis occidentalis*, *Delma nasuta*, *Cryptoblepharus carnabyi*, *Ctenotus alleni*, *Menetia surda* are at the southern end of their range.

The two agamids, *Amphibolurus m. maculatus* and *A. minor*, and the skink, *Ctenotus mimetes* were the only species gravid in September. Many other species were approaching breeding in September; they had developing ovarian follicles and large testes compared to autumn samples.

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