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# THE *DIPLODACTYLUS VITTATUS* COMPLEX (LACERTILIA, GEKKONIDAE) IN WESTERN AUSTRALIA

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**ABSTRACT**

Three species occur in Western Australia: *D. ornatus* Gray, *D. polyophthalmus* Günther and *D. granariensis* nov. The last-named species extends to western South Australia; further east it is replaced successively by *D. furcosus* Peters and *D. vittatus* Gray.

## INTRODUCTION

Kluge (1967) combined all the forms of the complex into a single taxon, *D. vittatus*. King (1977) questioned this arrangement, suggesting that the complex consisted of five species. After examining all the material in the Western Australian Museum and some specimens in the Australian Museum, I agree broadly with King but differ in the allocation of certain populations.

Because of sympatry without hybridization, it is clear that three species occur in Western Australia. The west-coastal species (the northwestern segment of King's chromosomal race "$2n$ = 38 WA *A*") is *D. ornatus*. The spotted gecko of the Darling Range (King's "$2n$ = 38 WA *B*") is *D. polyophthalmus*. The species centred on the Western Australian Wheat Belt is herein named *D. granariensis*; it consists of King's "$2n$ = 36 WA" plus the southeastern segment of his "$2n$ = 38 WA *A*" and that part of his "$2n$ = 38 EA" from west of Spencer Gulf.

At first I thought the name *vittatus* could be applied to the Wheat Belt species. However the type of *vittatus* does not agree with any western population and was almost certainly collected by Allan Cunningham during his expedition from the

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Hunter River to the Darling Downs in 1827. At any rate, Kluge's restriction of the type locality to the Darling Range was invalid, for Cunningham never visited that part of Western Australia.

I am grateful to Mr A.F. Stimson of the British Museum (Natural History) for the loan of the holotype of *D. vittatus* (registered number 1946.9.7.43), the lectotype of *D. polyophthalmus* (67.2.19.16) and the holotype of *D. ornatus* (1946.9.7.26). The last specimen was figured by Gray (1867, pl. 16, fig. 2).

## *DIPLODACTYLUS ORNATUS*

*Diplodactylus ornatus* Gray, 1845, Catalogue of the specimens of lizards in the collection of the British Museum, p.149. "Houtman's Abrolhos" (J. Gilbert) [probably in error for Champion Bay, W.A.].

### Diagnosis

A medium-sized long-tailed member of the complex with ocellate flanks and pale, dark-edged vertebral stripe. Further distinguishable from sympatric *D. granariensis* by longer snout, lower head, much smaller anterior supranasals (less than half as high as rostral and usually separated), smaller posterior supranasals (separated in 76% of specimens by more than 4 granules), higher first labial, darker lips, mental (usually wider than high), and wider subdigital lamellae.

### Distribution

West-coastal dunes and near-coastal sandplains of Western Australia from Exmouth Gulf south to Jurien Bay and inland to East Yuna and Coorow.

### Description

Snout-vent length (mm): 21-58 (N 79, mean 47.1). Length of tail (% SVL): 62-80 (N 36, mean 69.2).

Rostral quadrangular with upper side more or less arched, 1.8-3.1 times as wide as high (N 74, mean 2.39), median groove extending down for 10-55% of scale (N 74, mean 39). Nostril surrounded by first labial, rostral, 2 supranasals and 3-6 postnasals (usually 4, N 77, mean 4.1). Anterior supranasals less than half as high as rostral (N 78) and separated by one (38%), two (36%) or three granules (17%), or in short (6%) or moderately long contact (3%). Posterior supranasals small and separated by 3-7 granules (N 77, mean 5.1). Upper labials 8-11 (N 79, mean 9.2) back to middle of eye. Mental 0.8-1.3 times as wide as high (N 79, mean 0.94). First lower labial 1.2-1.9 (N 46, mean 1.59) times as high as wide. Anterior lower labials gradually decreasing in size. Subdigital apical plates moderately large, separated on

fourth toe by 2 or 3 (rarely 4) rows of granules from 2-5 wide lamellae (N 66, mean 3.8) tending to be dumbbell-shaped and usually well differentiated from 1-6 (N 66, mean 3.9) rows of circular scales on base of toe. Cloacal spur comprising 3-9 large pointed scales (N 36, mean 6.1).

Dorsal and lateral ground colour dark grey or greyish brown. Bold pale grey or pale brown vertebral stripe, bifurcating on nape before passing forward above temples and canthus rostralis; margins of stripe shallowly serrate to deeply sinuous on back, and deeply to very deeply sinuous on tail. Lower edge of vertebral stripe black or blackish brown, continuing forward on side of head as dark loreal stripe. Upper lips partly or wholly dark. Under limbs and tail spotted dark grey (spots coincident with whole granules); under digits dark grey; rest of under surface whitish, each granule bearing a dark central dot.

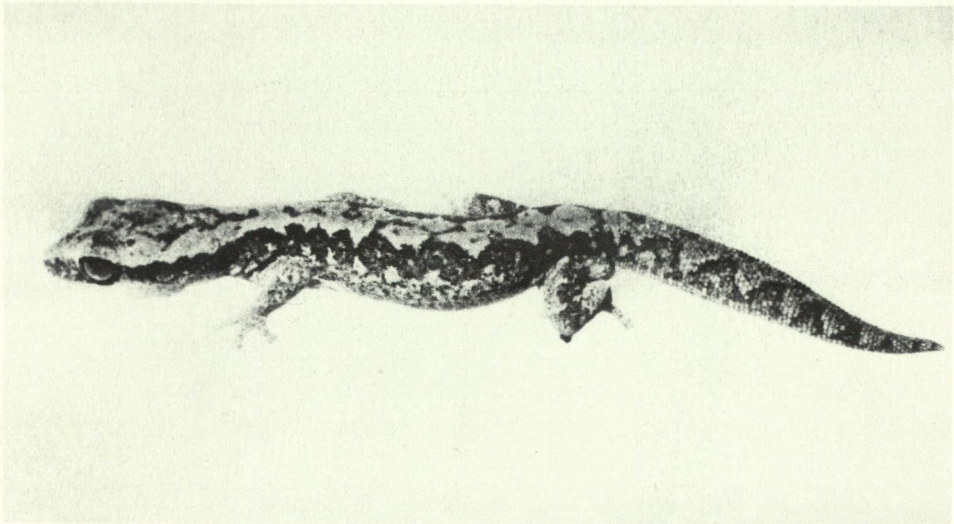

**Plate 1.** A *Diplodactylus ornatus* from the Marchagee Reserve, photographed in life by Mr T.M.S. Hanlon.

### Geographic variation

Northern geckos (Exmouth Gulf to Shark Bay) are small (maximum snout-vent length 50 mm).

### Material

North-west Division (W.A.): Learmouth (11515); Maud Landing, Cardabia (15243); Quobba (13436*a* and *b*); Dirk Hartog I. (42338, 44543, 45818-9); False Entrance Well, Carrarang (39027, 54827, 55193-4); Baudin I. (25686); 10 km NE of Denham (54828-30); Denham (49987); 8 km SE of Nanga (54850-1).

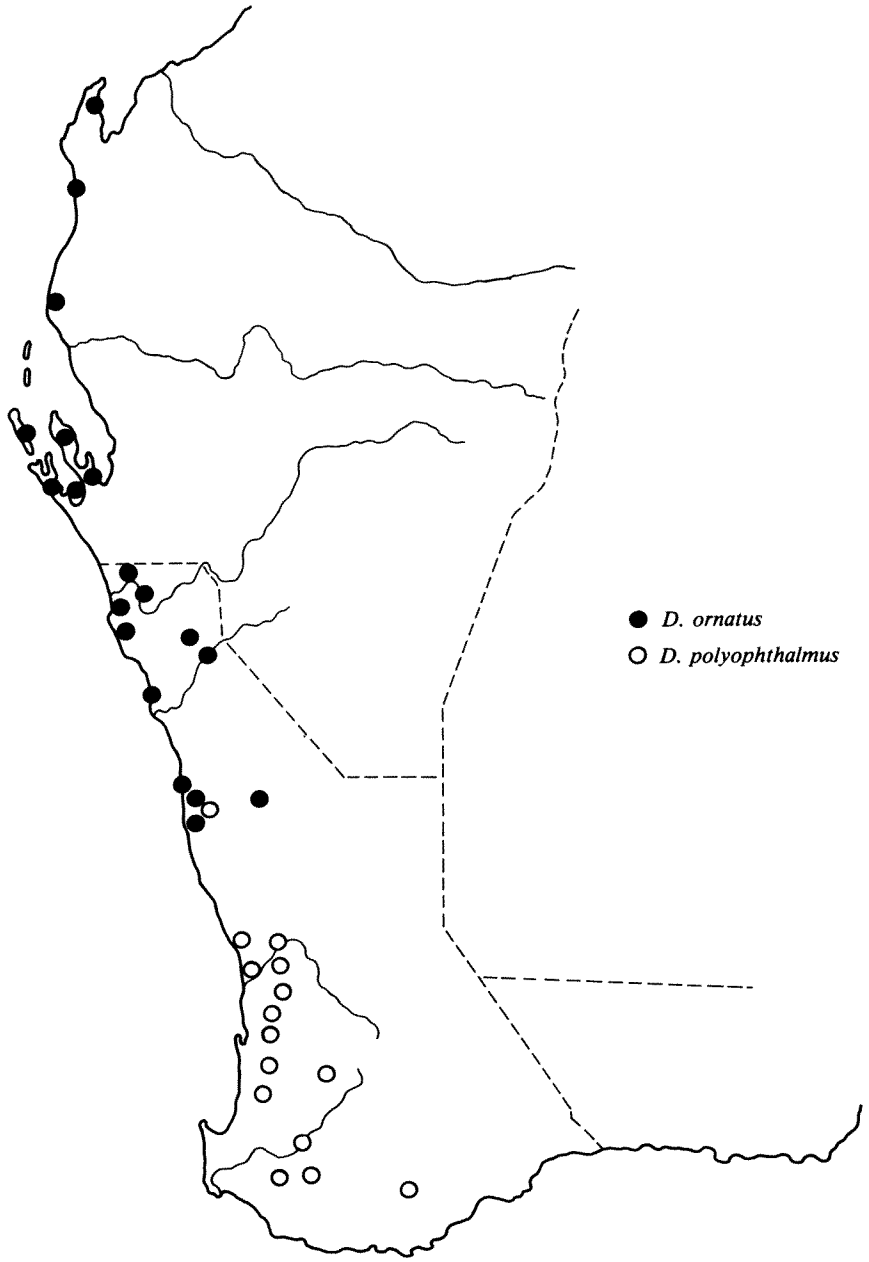


**Fig. 1.** Map of south-western Western Australia showing location of specimens of *Diplodactylus ornatus* and *D. polyophthalmus*.

South-west Division (W.A.): Kalbarri National Park, including Mt Curious, The Loop, Junga Dam, Four-ways, 18 km S of Kalbarri and 30 km NNW of Ajana (33459, 33598, 33630-1, 33664, 33704, 33752, 33870, 33936-7); Balline (13551); 28 km NE of Yuna (57518); East Yuna Reserve, 50 km ESE of Yuna (48078, 48083, 48243-4, 48246-7, 48251, 49917, 56999-57001); Bindoo Hill Reserve, 33 km N of Tenindewa (48062, 48204); Geraldton (51187); Beagle Point (19754); 13 km SW of Eneabba (22238); Marchagee Reserve, 10 km S of Coorow (49989, 57604-5, 57755, 57776-9); Green Head (57592); 2 km W of Mt Peron (49124); 5 km W of Padbury (48452, 48469, 48489-94, 49099); 6 km S of Padbury (48514); Mt Lesueur (49124); 9 km NE of Jurien Bay (46562-5); Jurien Bay (26665).

## *DIPLODACTYLUS POLYOPHTHALMUS*

*Diplodactylus polyophthalmus* Günther, 1867, Ann. Mag. nat. Hist. (3)**20**:49. Nickol Bay and Champion Bay, W.A. (Duboulay). [Kluge (1967: 1035) designated the "Champion Bay" specimen as lectotype after discovering that the Nickol Bay specimen was a *D. stenodactylus*.]

### Diagnosis

A small flat-headed member of the complex with relatively short thick tail and with colour pattern consisting mainly of pale reddish brown spots on a dark reddish brown ground (i.e., there are no bold dark-edged pale vertebral stripe or dark-edged pale dorsal blotches, and there is no black or blackish brown on back and sides). In northern Darling Range easily distinguished from sympatric *D. granariensis* by coloration, lesser size, thicker tail, longer snout, lower head, smaller supranasals, more postnasals, higher and wider first upper labial, lower mental and first lower labial, and sharp decrease in size between second and third lower labials. In the south of their common range, differences between the two species are generally reduced.

### Distribution

Humid southwest of Western Australia from Cockleshell Gully south-southeast through the Darling Range to the Stirling Range.

### Description

Snout-vent length (mm): 23-56 (N 91, mean 43.7). Length of tail (% SVL): 49-69 (N 27, mean 58.2).

Rostral quadrangular with upper side more or less arched, 1.8-3.0 times as wide as high (N 79, mean 2.26); median groove extending down for 10-65% of scale (N 72, mean 39). Nostril surrounded by first labial, rostral, 2 supranasals and 3-6

postnasals (usually 4 or 5, N 81, mean 4.6). Anterior supranasal up to half as high as rostral (N 91), in short (36%) or moderately long (31%) contact with its opposite number or separated by a granule (29%). Posterior supranasals small and separated by 2-6 granules (N 85, mean 4.3). Upper labials 8-11 (N 84, mean 9.1) back to middle of eye, first usually higher than second. Mental 0.8-1.4 times as high as wide (N 86, mean 0.98). First lower labial 0.8-1.8 times as high as wide (N 31, mean 1.31). Third lower labial usually markedly smaller than second. Subdigital apical plates moderately large, separated on fourth toe by 2 or 3 (rarely 4) rows of granules from a median series of 2-5 (N 57, mean 3.6) moderately large, circular lamellae, not strongly differentiated from 3-8 (N 57, mean 4.6) rows of smaller circular scales on base of toe. Cloacal spur comprising 5-13 long pointed scales (N 29, mean 8.7).

Dorsally and laterally dark reddish brown, spotted with pale reddish brown. Spots on head, back and tail larger, less circular and often less sharply defined than those on sides; paravertebral spots of one side often confluent with those of other side to form transversely or obliquely elongate blotches; dorsal spots occasionally so large as to leave only a reticulum of ground colour. Lateral ground colour continuing forward as a dark stripe through temples and orbit to lores. Upper lips dark. Under surfaces white, each granule bearing a dark central dot.

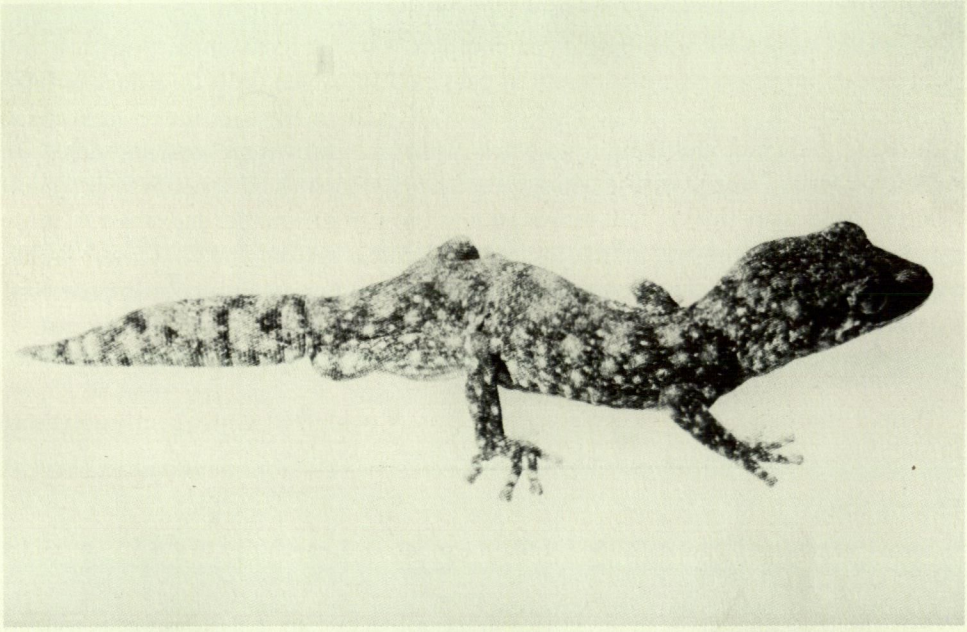

**Plate 2.** A *Diplodactylus polyophthalmus* from Mt Dale, photographed in life by Mr T.M.S. Hanlon.

**Geographical variation**

Specimens from the Tuart belt of the northern Swan Coastal Plain (Yanchep to Kings Park) are considerably larger than those from elsewhere (SVL 30-56 mm, N 8, mean 47.7; *vs* 23-52, 82, 43.2). This apparently isolated population also differs in having more granules between the posterior supranasals (4-6, N 8, mean 5.4; *vs* 1-6, 77, 4.1). In the far northern population (Cockleshell Gully) the tail is longer than elsewhere (59-69% of SVL, N 4, mean 65; *vs* 49-65, 28, 57); this seems to be an isolated population too.

**Remarks**

The lowest of the three specimens from Darlington photographed by Kluge (1967, pl. 1, fig. 1) is a *D. polyophthalmus*; the others are *D. granariensis*.

**Material**

South-west Division (W.A.): 4 km NW of Mt Peron (49049); 5 km W of Padbury (49098); Mt Lesueur (11169-70, 48434); 8 km S of Yanchep (15244); Wanneroo (26856-7); Kings Park (3327, 15246-9); Forrestfield (19368); East Victoria Park (11484); Maddington (388); W of Northam (11256); Noble Falls (21829); Parkerville (39165-6); Mundaring district (14538, 14851-3, 15022, 16518-9, 19655, 20592, 24090, 26444, 39649, 49956); Zamia (21341); Darlington (21261); Stathams (5998, 6000); Gooseberry Hill (2838, 4493, 4671-3); Kalamunda (2978, 15208); 8 km E of Kalamunda (57603); Lesmurdie (15250); ridge E of Seaforth (15251); Kelmscott (51425, 51427-8); Roleystone (15252-3); Karragullen (1420, 15254-5); 25 km SE of Karragullen (15256); Mt Dale (49713, 57602); Ashendon (39643, 39650); Canning Dam (54245-7); 3 km SE of Armadale (51188); Gleneagle (32469); 7 km E of Jarrahdale (19367); Serpentine (2340-1, 13656, 54248); Banksiadale (6794); Mt William (57316); Williams (4709-10); 25 km W of Collie (49253-5); Boyup Brook (3412); Manjimup (5606); between the upper reaches of the Perup and Tone Rivers (42553); Tolls Pass, Stirling Range (1995).

## *DIPLODACTYLUS GRANARIENSIS* SP. NOV.

**Holotype**

R54239 is Western Australian Museum, collected by R.B. Humphries on 10 August 1973 at Walyahmoning Rock, W.A., in 30°38′S, 118°43′E, and karyotyped by M. King.

**Diagnosis**

A moderately large, thin-tailed member of the complex with short snout, deep head, pale lips and a pale, dark-edged vertebral stripe bifurcating on nape (regional-

ly broken up on back and tail into angular, kidney-shaped, circular, amoeboid or lens-shaped blotches). Further distinguishable from sympatric *ornatus* by lack of lateral ocelli, much larger supranasals (anterior more than half as high as rostral and almost invariably in median contact; posterior much larger than postnasals and seldom separated by more than four granules), lower and narrower first upper labial, and mental usually higher than wide. Further distinguishable from sympatric *polyophthalmus* by lower and narrower first upper labial, gradual decrease in size in anterior lower labials (rather than sharp decrease between second and third) and wider subdigital lamellae (distally tending to be elliptic rather than circular).

**Distribution**

Southern Western Australia; north to the Hutt River, East Yuna, nearly to Mt Jackson (Pigeon Rocks), Comet Vale, Queen Victoria Spring and the northern edge of the Nullarbor Plain; and south and west to a line through Jurien Bay, Mooliabeenee, the Darling Range, Collie, Kojonup, the Stirling Range and the Fitzgerald River. Extra-limital in western and southern Eyre Peninsula (S.A.). A different and apparently isolated population in the Wiluna district.

**Description**

Snout-vent length (mm): 25-62 (N 308, mean 48.6). Length of tail (% SVL): 51-78 (N 170, mean 65.1).

Rostral quadrangular with upper side more or less arched, 1.9-3.4 times as wide as high (N 218, mean 2.43); median groove extending down for 0-70% of scale (N 218, mean 29). Nostril surrounded by first labial, rostral (almost invariably), prenasal (very rarely), 2 supranasals and 2-5 postnasals (mostly 3 or 4, N 283, mean 3.3). Anterior supranasals half or more as high as rostral (N 298) and in long (48%), moderately long (37%) or short contact (10%), or separated by one (4%) or two granules (1%). Posterior supranasals moderately large and separated by 1-7 granules (mostly 2-4, N 295, mean 3.0). Upper labials 7-12 (N 278, mean 8.9) back to middle of eye, first usually a little lower and narrower than second. Mental 0.8-1.7 times as high as wide (N 246, mean 1.09). First lower labial 1.0-2.3 times as high as wide (N 229, mean 1.68). Anterior lower labials gradually decreasing in size backwards. Subdigital apical plates moderately large, separated on fourth toe by 2 or 3 (rarely 4, very rarely 5) rows of granules from a median series of 1-9 (N 197, mean 4.5) moderately large circular or transversely elliptic lamellae, often poorly differentiated from 0-7 (N 195, mean 3.3) rows of smaller circular scales on base of toe. Cloacal spur comprising 4-14 long pointed scales (N 82, mean 7.9).

Dorsal and lateral ground colour greyish brown. In northern inland parts of range a bold greyish white, brownish white or pale brown vertebral stripe, bifurcating on nape as it passes forward above temples; margins of stripe on back and tail nearly straight or shallowly to deeply sinuous or serrate; stripe edged below with blackish

brown; pale lateral spots seldom present and never black-edged; blackish lower lateral spots often present (apparently remnants of lower margin of pale sinuous midlateral stripe); lips usually white and contrasting strongly with darker coloration of face; rest of under surface white, granules with or without a dark central dot. Towards coasts and in southern interior vertebral stripe becoming increasingly irregular and broken; pale spotting on flanks increasing; and blackish lower lateral spots disappearing.

**Plate 3.** A *Diplodactylus granariensis* from the Brookton Highway 54 km ESE of Kelmscott, photographed in life by Mr T.M.S. Hanlon.

**Geographic variation**

The vertebral stripe in the northern inland parts of range (west to East Yuna, Marchagee, New Norcia and Darlington, and south to Narrogin, Kondinin, Mt Holland, Newman Rocks and Frazer Range), though becoming increasingly indented southwards, is seldom broken. Further south (north to Collie, North Tarin Rock, Lake Varley, Salmon Gums, Caiguna and Eucla) the vertebral stripe is usually broken up into a highly variable series of blotches. Concurrently with these clinal changes in pattern, the body becomes shorter, the head less deep, the supranasals smaller, the postnasals more numerous, the mental lower and the lips darker; and according to King (1977) the diploid chromosome number increases from 36 to 38. All these changes are in the direction of *D. polyophthalmus*, so that at their southern limit in the Stirling Range the two species are not easily separated.

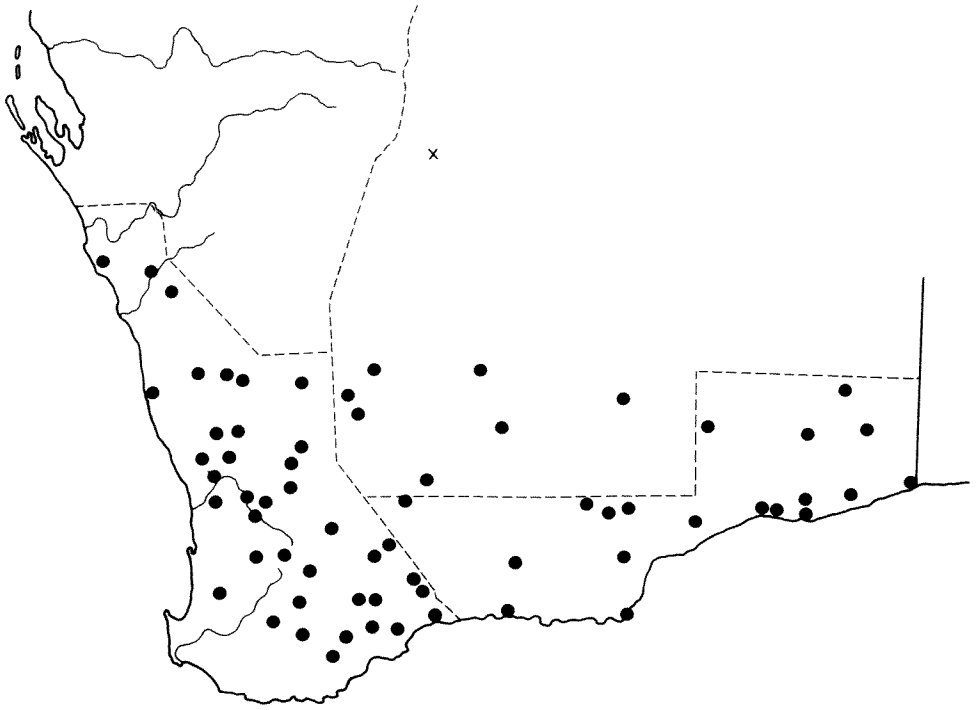

**Fig. 2.** Map of southern Western Australia showing location of specimens of *Diplodactylus granariensis*. Cross indicates location of peculiar specimen from Wiluna.

On the west coast, from the Hutt River south to Jurien Bay and inland to Mooliabeenee, the vertebral stripe is deeply sinuous or broken up into blotches. In all other respects these geckos agree with those of the northern interior rather than with the superficially similar southern populations.

In October 1977 Mr J.C. Wombey of CSIRO Wildlife Research collected a *granariensis* at 13 km E of Wiluna, i.e. nearly 500 km NE of the mulga-eucalypt line. This specimen is remarkable for its great size (SVL 69 mm), very wide ungrooved rostral, and narrow vertebral stripe with almost straight margins; it is located on map (**Fig. 1**) by a cross. West of the Nullarbor Plain typical *granariensis* extends inland only to the mulga-eucalypt line.

Our specimens from Elliston (25977-26000) and Port Neill (27339-42), Eyre Peninsula, are similar to *granariensis* from southern Western Australia.

Our specimens from the Flinders Ranges east of Port Augusta (55760-3) are fairly similar to *granariensis*. They have a short snout, very deep head, large supranasals and low first upper labial, but the tail is much shorter (45, 47 and 57% of SVL).

According to King (1977) this population has 2 N = 34 chromosomes; it probably represents a full species, *D. furcosus* Peters.

Eleven specimens from southeastern Queensland and eastern New South Wales, kindly loaned by Dr A.E. Greer of the Australian Museum, are more like *ornatus* than *granariensis*. The head is low, the first upper labial higher than the second, the mental usually lower than wide, and the flanks are often dark, spotted with white. However the tail is much shorter (50-59% of SVL, N 8), and in all but one specimen the anterior supranasals are contiguous. I believe that the type of *D. vittatus* Gray came from this population.

**Paratypes**

South-west Division (W.A.): 12 km E of mouth of Hutt River (27397-9); East Yuna Nature Reserve, 50 km ESE of Yuna (48084, 48087, 48245, 56997-8); Wilroy Reserve, 19 km S of Mullewa (57642, 57648, 57650-2, 57658-9, 57671-3, 57675-7, 57681-2, 57685); Buntine (43612-5, 43622-6); Marchagee Reserve, 10 km S of Coorow (57775); 8 km NE of Mt Peron (25286-7); 4 km E of Mt Peron (49002-3, 49015, 49021-3); 5 km W of Padbury (49100); 25 km E of Jurien Bay (22277); 26 km NE of Dalwallinu (57892-6); 20 km NE of Dalwallinu (57867-79, 57897-906); 12 km NE of Dalwallinu (51109-10, 51112-6, 57880-91); 48 km N of Beacon (48312-3, 48333, 48356); Wongan Hills (50245); 11 km NE of New Norcia (25674, 26859); Trayning Reserve, 11 km E of Kununoppin (45967-70, 46138, 46321-2, 46330, 46333, 46355-8); 17 km NW of Kellerberrin (52360-1); Yorkrakine Rock (52316); 13 km W of Bolgart (27395-6); Mooliabeenee (3323); Lower Chittering (40230); Culham (15245); 25 km SW of Toodyay (22842-3); "Wanneroo" (26858); Chidlows (54240); Darlington (15249); Boya (29288); ridge E of Seaforth (15292); York (54250); 3 km NW of Beverley (50007); 5 km SW of Mawson (50005-6); 21 km NE of Quairading (52208-15, 52401-2); 8 km NE of Bendering (52565-70); Bendering (43427); Dryandra (31948); 25 km E of Yornaning (32°45′S, 117°22′E) (50208-15, 51334-40); Lake Varley (19808-9, 28951, 29046); Dragon Rocks Reserve (42977); 11 km NW of Dragon Rocks (42991); Dongolocking Reserve (33°02′S, 117°43′E) (49578-81, 49585-7, 49758-9); North Tarin Rock Reserve (40060, 40084, 44423); 11 km W of Darkan (26005); Collie (1958); Kojonup (22849); 10 km E of Woodanilling (23349); Greenshields Soak, 28 km E of Pingrup (39842-3, 39881, 39886, 39918-21); Lake Magenta Reserve, including Sullivans Soak and 48 km E of Pingrup (39902, 43000-1, 43006, 43985, 45306); 32 km NNE of Ravensthorpe (47624); 8 km N of Ravensthorpe (30827-8); 8 km N of Hopetoun (55934); middle Fitzgerald River (36008, 36787-90, 36873, 36935, 36952-3); Jerramongup (15257-8); Ongerup (54244); 10 km SE of Ongerup (42616); 87 km N of Mt Barker (54242); Chester Pass, Stirling Range (17867-8).

Eastern Division (W.A.): Pigeon Rocks (36435); 52 km NNE of Bonnie Rock (57040); Walyahmoning Rock (41180-1, 54241, 54243); Comet Vale (26384); Queen Victoria Spring (48056); Kalgoorlie (20607); 48 km S of Karalee (33955).

Eucla Division (W.A.): Split Rock, 30 km N of Mt Holland (37821); Newman Rocks (15263-4, 53438-43); 13 km E of Frazer Range (30751-5); Salmon Gums (30789); Dalyup River (12259-60); Point Malcolm (37732); Coragina Rock (15261-2); 33 km N of Balladonia Hotel (29472); 21 km E of Balladonia (53345-7); 36 km NW of Rawlinna (41211, 41629); Seemore Downs (15999); 80 km NE of Rawlinna (41194-7); 40 km W of Caiguna (31894); S of Caiguna (28153); 8-14 km SE of Cocklebiddy (24663-7, 27369, 31892, 53375-86, 53418, 54249); Roe Plains, 25 km ESE of Cocklebiddy (34451-61); Loongana (29173); 100 km NE of Loongana (41625); Forrest (26029); Madura (24652); 20 km S of Madura (34485); 45 km S of Madura (34439-41); Mundrabilla (25514); Eucla (24601-2).

**Postscript**

Through the courtesy of Mr Wombey, I have recently examined a specimen of *D. granariensis* in his collection from Mooloogool, 80 km NE of Meekatharra. This specimen scarcely differs from those of the northern Wheat Belt, which indicates that the species is widely (if sparsely) distributed north of the mulga-eucalypt line.

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