

## THE ENDEMIC AUSTRALIAN LIZARD GENUS *MORETHIA* (SCINCIDAE: LYGOSOMINAE) IN SOUTHERN AUSTRALIA

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### Abstract

The taxonomy and status of the five southern Australian species of *Morethia* are discussed and lectotypes are nominated to stabilize the nomenclature. Details of the species distributions are provided and the ecology, reproduction, generic relationships and phylogeny of the species are briefly mentioned.

### Introduction

Boulenger (1887) carried out the first major revision of the family Scincidae in the third volume of his *Catalogue of Lizards in the British Museum (Natural History)*. In the Preface to this volume Dr A. Gunther stated: 'I feel confident that it will give a fresh impulse to the systematic study of lizards, and serve as the standard work for many years to come'. Gunther's confidence was generally well placed and Boulenger's Catalogues became the standard reference works. However, in some groups rather than give a fresh impulse to systematic studies, Boulenger's concepts caused a stagnation that lasted more than half a century. One such group was the large and clumsy genus *Lygosoma* with its eleven subgenera, and another was the genus *Ablepharus* into which Boulenger placed all skinks with an immovable transparent lower eyelid (the 'ablepharine' eye). These genera were long recognized to be polyphyletic, but it wasn't until Mittleman (1952) erected the subfamily Lygosominae and revised the included genera that a new stimulus was provided. Mittleman included the species Boulenger had placed in *Ablepharus* in the Lygosominae and broke up the genus. Since that time work on the higher taxa of Lygosomine skinks has made rapid progress and the species Boulenger included in the genus *Ablepharus* have been reclassified.

The Australian skinks which were included in Boulenger's definition of the genus *Ablepharus* have been dealt with in two main papers. Greer (1967) convincingly demonstrated the artificial nature of the 'ablepharine' eye taxonomically and phylogenetically when

he united a group of closely related 'ablepharine' and 'non-ablepharine' skink species in the genus *Lerista*. Subsequently Fuhn (1969) separated the Australian 'ablepharine' skinks into nine groups, one of which was the genus *Morethia* Gray, 1845. Fuhn separated the genus *Morethia* on the basis of skull morphology and in doing so successfully placed a natural group of closely related species into one genus. *Morethia* is now recognized to be an endemic Australian genus which is not clearly related to any non-Australian genus (Storr 1972) and even its Australian relationships are unclear (Rawlinson 1974). The genus presently consists of six described species, two described subspecies and an undescribed 'race' (Storr 1972).

The *Morethia* species and subspecies (and therefore the genus) can be divided into two geographical and evolutionary groups: a 'northern' group centered in the arid and semi-arid tropical areas of Australia; and a 'southern' group centered in the arid and semi-arid temperate areas of Australia. The 'northern' group consists of: *M. taeniopleura taeniopleura* (Peters 1874) found in N and E Queensland, which reaches to 27½° S but is centered N of the Tropic of Capricorn 23½° S; *M. taeniopleura ruficauda* (Lucas and Frost 1895) found in N Northern Territory and N Western Australia, which reaches to 25½° S but is centered N of the Tropic of Capricorn; *M. taeniopleura exquisita* Storr 1972 found in NW Western Australia, which reaches to 25° S but is centered N of the Tropic of Capricorn; and an undescribed race of *M. taeniopleura* recorded from the N of the Northern Territory by Storr (1972). These

'northern' taxa are allopatric and appear to be mutually exclusive (Storr 1972).

The 'southern' group consists of the remaining five described species and it appears to have radiated more widely than the 'northern' group. Three of the five 'southern' species, *M. adalaidensis*, *M. butleri* and *M. obscura*, although reasonably widely distributed are restricted to arid and semi-arid areas S of 27½° S; the fourth species, *M. lineocellata*, is virtually restricted to the SW coast of Western Australia but it extends above the Tropic of Capricorn to about 20½° S; the fifth species, *M. boulengeri*, is widely distributed across S Australia and it extends just above the Tropic of Capricorn to about 22½° S in S Queensland. Of the 'southern' taxa, *M. boulengeri* and *M. butleri* are allopatric and appear to be mutually exclusive as do *M. lineocellata* and *M. obscura*; *M. butleri* and *M. adalaidensis* are largely allopatric but overlap in SE Western Australia; and *M. adalaidensis*, *M. boulengeri* and *M. obscura* overlap widely across S Australia. Thus it can be seen that the Tropic of Capricorn forms a boundary between the 'northern' and 'southern' groups of *Morethia* and it is the five 'southern' species as defined above which are dealt with in detail in this paper.

Two recent local revisions of the genus *Morethia* included the five 'southern' species. The first revision, published by Smyth (August 31, 1972) was of the South Australian species but it also included all specimens of *Morethia* in the South Australian Museum. Storr published the second revision (November 3, 1972), which was of the Western Australian species but it also included all specimens of *Morethia* in the Western Australian Museum. Unfortunately Smyth's and Storr's papers contain some conflicting interpretations and neither author examined the types of *Morethia lineocellata* (Dumeril and Bibron 1839) which was the first of the *Morethia* species described and hence the most important taxonomically. The present paper deals with the 'southern' *Morethia* species in Queensland, New South Wales and Victoria, and as the author has examined all relevant type specimens, the

opportunity to correct the conflicts between Smyth's and Storr's papers is taken. Also, as the author has examined and identified all *Morethia* specimens in the Queensland Museum (QM) Brisbane, the Australian Museum (AM) Sydney, and the National Museum of Victoria (NMV) Melbourne, detailed lists of these specimens are provided under the appropriate headings below to complement the data in Smyth and Storr. As there is no *Morethia* material in the Tasmanian Museum, Hobart, or the Queen Victoria Museum, Launceston, the data in Smyth's and Storr's papers and the present paper represents a complete listing of the 'southern' *Morethia* specimens held in the Australian state museums.

#### Genus *Morethia* Gray, 1845

*Morethia* Gray, J. E., 1845, *Catalogue of lizards*: 65.  
 TYPE SPECIES: *Morethia anomalus* Gray, 1845,  
*Ibid.*: 65 = *Ablepharus lineocellatus* Dumeril,  
 and Bibron, 1839, *Erpetologie Generale* 5: 817.

*Remarks*: Smyth (1972) incorrectly listed *Ablepharus lineocellatus* Dumeril and Bibron 1839 as the type species of the genus. Storr (1972) listed *Morethia anomalus* Gray 1845 as the type species by monotypy and in the same paper designated *M. anomalus* as a junior subjective synonym of *A. lineocellatus*.

*Diagnosis*: Small skinks (snout-vent length 17-56 mm); an 'ablepharine' eye i.e. lower eyelid an immovable transparent disc fused to the eye surface; frontoparietals and interparietal fused into a single large shield; parietals contact along midline; supranasal and postnasal scales present but may be fused to each other or to nasal scale; frontonasal in broad contact with the rostral; frontal much larger than the prefrontals; prefrontals rarely in contact; four supraoculars, second the largest, first and second contact the frontal, second third and fourth contact the frontoparietal-interparietal shield; one pair of nuchal scales; seven (occasionally eight) upper labial scales, the fifth largest and completely subocular; eight to ten preanal scales, central four slightly enlarged; limbs pentadactyl; digits not elongate, 14-27 lamellae under the fourth toe; body scales smooth, moderately large, 24-34 rows at midbody; external ear opening obvious.

In the descriptions of *Morethia* species and specimens below, scalation details consistent with the generic description above are not repeated.

KEY TO THE SOUTHERN AUSTRALIAN SPECIES OF *MORETHIA*

1. Subdigital lamellae acutely keeled, unicarinate to tricarinate; five or six supraciliaries ..... 2.  
Subdigital lamellae smooth or obtusely keeled; six supraciliaries ..... 3.
2. Five supraciliaries, the third, fourth and fifth largest, subequal, and penetrate deeply between the supraoculars; subdigital lamellae unicarinate or tricarinate ..... *M. adelaidensis*  
Six supraciliaries, the first the largest and the remainder forming a decreasing series, junctions of supraciliaries with supraoculars linear or slightly curved, supraciliaries do not penetrate between supraoculars; subdigital lamellae unicarinate ..... *M. butleri*
3. First and third supraciliaries largest, fourth much smaller than third, fourth, fifth and sixth successively smaller ..... *M. boulengeri*  
First supraciliary never largest, fourth not smaller than third ..... 4.
4. Third, fourth and fifth supraciliaries largest, subequal and penetrate deeply between the supraoculars, sixth much smaller than fifth; supranasal often fused to nasal ..... *M. lineocellata*  
Fourth supraciliary largest, fourth, fifth and sixth form a rapidly decreasing series, third and fourth penetrate deeply between supraoculars; supranasal always separate from nasal . . . . *M. obscura*

***Morethia adelaidensis* (Peters 1874)**

(Fig. 1)

*Ablepharus (Morethia) anomalus adelaidensis* Peters, 1874, *Mber. Preuss. Akad. Wiss.*: 375-376.

*Ablepharus lineocellatus* C var. *adelaidensis* Boulenger, 1887, *Catalogue of the Lizards in the British Museum (Natural History)*. 3: 349.

*Ablepharus lineocellatus* (part) Zietz, 1920, *Rec. S. Aust. Mus.* 1: 220-221.

*Morethia adelaidensis* Smyth, 1972, *Rec. S. Aust. Mus.* 16: 1-14. Figs. 1, 6.

——— Storr, 1972, *J. R. Soc. W. Aust.* 55: 73-79. Figs. 1, 2.

**Lectotype:** Smyth (1972): ZMB 4733, Zoologisches Museum der Humboldt Universität zu Berlin. Locality: Adelaide. Collector: Schomburgk. No other data.

**Description:** See Smyth (1972).

**Remarks:** The lectotype, selected by Smyth in 1971, was the largest of three syntypes under this catalogue number and the paralectotypes have now been given new numbers, ZMB 42872-73, data as for lectotype.

Smyth (1972) and Storr (1972) both commented on Peters' (1874) use of the name *Ablepharus (Morethia) anomalus adelaidensis* and neither considered Peters' description adequate. However, Smyth considered Peters' use of the name constituted a valid indication of a species, ascribed the name to him, and accordingly selected one of Peters' three syntypes from the Berlin Museum as lectotype. Storr, however, did not consider Peters' use of the name constituted a valid indication of a species so he refused to ascribe the name to Peters, but he did not formally state it was a *nomen nudum*. Boulenger (1887) had ascribed the name *adelaidensis* to Peters when redescribing the 'variety' as *Ablepharus lineocellatus* C var. *adelaidensis*, and there is every chance he examined Peters' types for he stated in the Introduction to Volume 3 of his Catalogue 'With the object of rendering the account of the Lacertidae and Scincidae more perfect, I have devoted a month to the examination of the specimens in the Berlin Museum'. Storr regarded Boulenger as the proper authority for the name *adelaidensis* and accordingly selected a lectotype from the specimens described by Boulenger in the collection of the British Museum of Natural History in London: BM NH 64.10.27.9; Locality: South Australia; Collector: G. Krefft; no other data. Smyth had already examined the specimen which Storr subsequently designated as lectotype and identified it as *M. adelaidensis*. The present author has re-examined Storr's lectotype and confirms it is conspecific with the lectotype selected by Smyth (ZMB 4733).

Smyth's designation of the lectotype is cor-

rect and must be upheld. Storr's action would have been valid if Peters' use of the name *adelaidensis* constituted a *nomen nudum*, but Storr did not state this was the case and articles 11., 12. and 16. of the International Code for Zoological Nomenclature (1964) show Peters' use of the name constituted a valid indication of the species. It should be noted that Boulenger himself ascribed the name *adelaidensis* to Peters, so both authors were referring the name to specimens Peters had examined in the Berlin Museum and there is a great probability that Boulenger actually examined Peters' types. Smyth located these specimens and designated one as lectotype, and as Smyth's paper was published on August 31, 1972 and Storr's paper was published on November 3, 1972, Smyth's designation predates Storr's.

**Diagnosis:** Five supraciliaries, the third, fourth and fifth the largest, subequal, and all penetrate deeply between the supraoculars. Subdigital lamellae acutely keeled, unicarinate or tricarinate. Palmar tubercles elongate and apically rounded.

**Description:** Snout-vent length 17-60 mm, mean 46.1 mm. Total length adults with intact tails 104-138 mm, mean 118.8 mm. Intact tail 120-172% of snout-vent length. Supranasals present, widely separated. Postnasals present but often fused to supranasals. Prefrontals narrowly separated. Frontonasal wider than long. Frontal longer than wide. One to three ear lobules, usually hidden by projecting preauriculars. Midbody scales in 26-34 rows (usually 28 or 30), mean 29.1. Lamellae under fourth toe 16-24, mean 19.7.

**Colour:** Olive-grey to olive-brown dorsal surface, often tinged with red-brown. Small black spots on back which tend to form broken lines. Pale dorsolateral stripe occasionally present on trunk. Broad dark brown to black upper lateral stripe strongly speckled with lighter markings runs from head onto tail. Wavy edged interrupted white mid-lateral line runs from upper labials, through ear, above forelimb and along trunk to hindlimb, usually margined below by a speckled brown band. Ventral surface unmarked, white. Males in

breeding condition develop an orange colour all around the edges of the ventral surfaces which extends onto the inside surfaces of both fore and hind limbs and is particularly prominent around the vent and anterior part of the tail.

**Distribution:** Arid and semi-arid-areas of SW Queensland; SW New South Wales; NW Victoria; NE to S South Australia; and SE Western Australia. (Figure 1.).

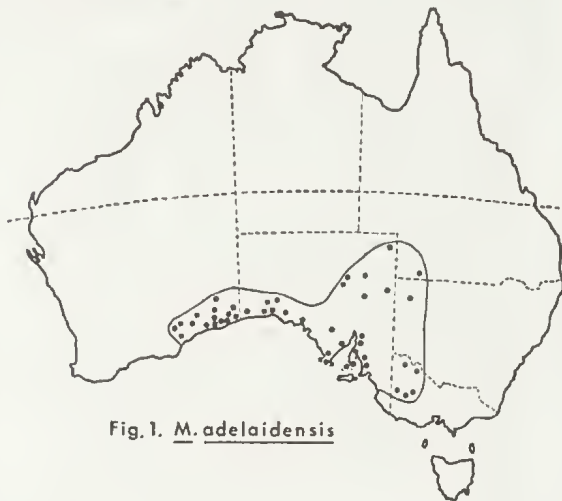


Fig. 1. *M. adelaidensis*

**Literature Records:** See lists in Smyth (1972) and Storr (1972).

**Specimens Examined:** *Western Australia:* (NMV) Western Australia, R 963; D 1013; D 1390: 15 mls E of Caiguna, D 44857: *South Australia:* (AM) South Australia, 4739: Fisher, Nullabor Plain, R 7274: (NMV) Central Australia, D 1181; D 1183-4: Gawler Ranges, D 2464-5: Ooldea Well, Overland Railway, N of Fowlers Bay, D 2473: Overland Railway, between Ooldea Well and Fowlers Bay, D 2758: Overland Railway to Western Australia, D 3059; D 3109; Lake Eyre, D 3103; D 3128; D 3135: Lake Harry, Birdsville Track, D 15027: Lake Wangary, Eyre Peninsula, D 15054-7; D 15059-60: 3 km NW of Poonindie, D 15078: Tumby Bay, Eyre Peninsula D 15078-80; D 15217: 18½ km S of Maitland, Yorke Peninsula, D 15093-7: Copley, D 15847-8: Benagerie Station, D 41509, D 41525: Innamincka area, D 41606-7: *New South Wales:* (AM) Moloch, R 6445

(3 specimens): *Victoria*: (NMV) Grampians, D 1090: 16 km W of Nowingi, D 14652: 13 km S Stawell, D 15064: Kerang, D 15163: 32 km S of Kaniva, D 15174-5: 29 km N of Swan Hill, D 15177: 10 km W of Nowingi, D 18106.

***Morethia boulengeri* (Ogilby 1890)**

(Fig. 2)

*Ablepharus boulengeri* Ogilby, 1890, *Rec. Aust. Mus.* 1: 10-11.

—— Zietz, 1920, *Rec. S. Aust. Mus.* 1: 220.  
*Ablepharus lineocellatus anomalus* (part), Loveridge, 1934, *Bull. Mus. Comp. Zool.* 77: 377-378.

*Morethia boulengeri* Smyth, 1972, *Rec. S. Aust. Mus.* 16: 1-14, Figs. 2, 6.

—— Storr, 1972, *J. R. Soc. W. Aust.* 55: 73-79, Figs. 1, 2.

*Lectotype*: Smyth (1972): AM R 690, Australian Museum, Sydney. Locality: Brawlin, New South Wales (34° 44' S 148° 02' E). Collector: H. J. McCooey. No other data.

*Description*: See Smyth (1972).

*Remarks*: Smyth (1972) noted that Ogilby incorrectly recorded a separate interparietal for the type. Storr (1972) listed Cootamundra, New South Wales (10 km N of Brawlin) as the type locality, which is the locality given for the specimen in the Australian Museum Register.

*Diagnosis*: Six supraciliaries, the first and third the largest; the fourth much smaller than the third; and the third, fourth, fifth and sixth are successively smaller. Subdigital lamellae smooth or obtusely uncarinate. Palmar tubercles rounded.

*Description*: Snout-vent length 27-55 mm, mean 44.6 mm. Total length adults with intact tails 102-121 mm, mean 109 mm. Intact tail 125-177% of snout-vent length. Supranasals present, widely separated. Postnasals present but often fused to supranasals. Prefrontals separated. Frontonasal wider than long. Frontal longer than wide. Seven upper labials normally, rarely eight but the fifth always largest and entirely subocular. Two to four obtuse ear lobules (usually two). Midbody scales in 25-32 rows, mean 29.8. Lamellae under the fourth toe 15-23, mean 19.6.

*Colour*: Olive-grey to brown dorsal surface, dorsal scales have 2-5 (usually 3) fine diver-

ging black lines which are often expanded and merge into black spots or streaks that are usually distributed irregularly, but may be organized into interrupted lines or streaks. A well-defined broad black upper lateral stripe runs from the eye back to the hindlimb where it becomes broken up. A prominent moderately wide pure white mid-lateral stripe begins on the upper labials and runs under the eye above the forelimb and along the trunk to the hindlimb. Usually there is also a narrow irregular black lower lateral stripe below the mid-lateral stripe. Ventral surface unmarked silver white. Adult males in breeding condition develop a bright orange throat. The tail of juveniles is red-orange, not pale fawn as recorded by Smyth (1972), adults have brown tails.

*Distribution*: Drier areas of S Northern Territory; S Queensland; New South Wales; NW and N Victoria; South Australia; and SE Western Australia. (Figure 2.).

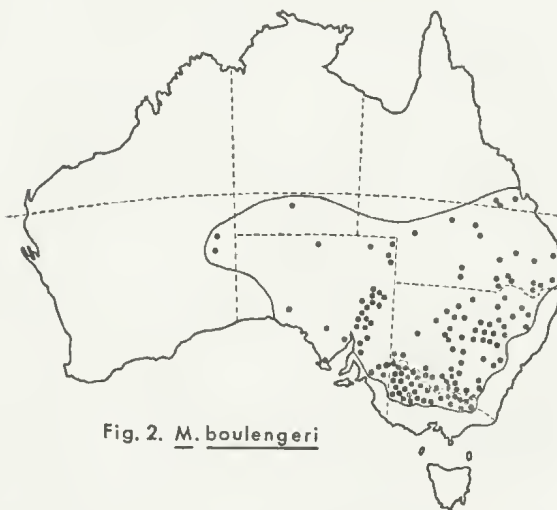


Fig. 2. *M. boulengeri*

*Literature Records*: See lists in Smyth (1972) and Storr (1972).

*Specimens Examined*: *Northern Territory*: (NMV) Illamurta, James Range, D 473; *Queensland*: (AM) Retro Station, Capella, R 12099 (2 specimens); R 12100 (2 specimens); R 12114 (3 specimens): Mungindi, R 15073; R 19083: Cunnamulla, R 17121; R 18464: Gilruth Plains, Cunnamulla, R 20662-3: 8 km

- S of Claremont, R 21312: Glenmorgan, R 21317: (NMV) Queensland, D 104: 5 km W of Amiens, D 9384: (QM) Bell, Darling Downs, J 2305-9: Retro Station, Capella, J 6232; J 15768: 24 km W of St. George, J 10456-7: 69 km S of Blackall, J 11564: Wivenhoe Bridge, Brisbane River Valley, J 11853: 24 km N of Mitchell, J 11854: Bryden, J 11855: Green swamp, 45 km E of Roma, J 11856; J 11954: Murphy's Lake, Taroom, J 11858: 6 km S of Ferndale, J 11859-60: Wivenhoe Bridge, 8 km N of Wivenhoe, J 11862-3: 10 km W of Westgrove HS., NW of Gympie, J 11864: 1½ km W of Westgrove HS., NW of Gympie, J 11865: Win dora, J 11866-8: Waratah Station via Cunnamulla, J 11869-71: Alum Roek Station via Amiens, J 11872: 16 km SE of Capella, J 11953: 8 km N of Stanthorpe, J 11955: Goondiwindi, J 13682: Jandowae, J 13773; J 13775-6; J 13778-81: Gilruth plains Field Station, Cunnamulla, J 14353: Batheaston Station, 128 km NW of Marlborough, J 15635-7: 35 km N of Augathella, J 21609: 88 km NW of Tamboo, J 21610; Binga Station via Cunnamulla, J 21946: Amiens near Stanthorpe, J 22316: Jollys Falls via Stanthorpe, J 22476: *South Australia* (AM) Port Lincoln, R 4764: (NMV) Purnong, D 1216: Overland Railway to Western Australia, D 3058: Whyalla, D 7743; D 7979-80: Alligator Gorge, Flinders Range, D 15220-2: Wertalona, D 41542: *New South Wales* (AM) Cootamundra, R 687-91; R 950: Brawlin, R 823; R 825-6: Narrabri, R 1042; R 1058: Western New South Wales, R 1073-4: Nidgera Ck., near Cootamundra, R 1745: Dubbo, R 1750-61: Narramine, R 1780: Boggabri, R 2023; R 2025; R 4169: near Liverpool, R 2174-5: Guntawang, R 3976: Nevertine to Warren, R 4871: Buddah Lakes, Trangii, R 5447: Penrose Farm, Bathurst, R 6268: Moloeh, R 6443: Darling R., between Bourke and Wilcannia, R 6457: Belubula, R 8077: Jaffa, Ashford Downs, R 9413: Yaneo district, R 10646: Yaneo Agricultural School, R 10648: Walcha, R 10769: Cuddie Springs, Brewarrina, R 11006: Bullerana, Moree, R 11054: Pilliga, R 11591: Bringagee, R 13432: Mootwingie Waterholes, R 14678-9: Warrumbungle Mountains, R 14973; R 18921; R 21076: Quam bone, R 15120; R 18722; R 18728; R 18753-4; R 18783: 21 km W of Byrock, R 15212: 24 km W of Byrock, R 15621: Moulamein, R 15841: Brewarrina, R 17674; R 18727: Lake Narran, R 17658; R 17711: Bourke, R 17886: Tocumwal, R 18143-5: Balranald, R 18146-8: Murray R., Moama, R 20357: Nymangee, R 20572; R 20642-3: 72 km W of Cobar, R 27409-10: Round Hill Fauna Reserve, between Lake Cargelligo and Mt. Hope, R 27825; R 27834; R 27839-40; R 27862-4; R 27904; R 29669: Old Harbour Lagoon, near Eumungie, R 28021-2; R 28024-6: between Tilpa and Barnato, R 28093: Coonabarabran, R 28095: Duek Ck., 48 km W of Warren, R 28160: 67 km S of Gilgunnia, Eubalong Rd., R 28341; R 28347-8: 32 km S of Cobar, R 29560: Yalgorgrin State Forest, 11 km ex. Gilgandra, R 29645: Lachlan R., 11 km N of Lake Cargelligo, R 30385-7: 64 km S of Gilgunnia, Mt. Hope to Eubalong Rd., R 30391: Moonabi Lookout, Moonabi Ranges, R 31741-2: 37 km W of Armidale on Bundarra Rd., R 31769; R 31785: 24 km W of Gilgandra, R 33087-98; R 33100-6: (NMV) Finley, D 152: Brawlin, D 749-51: Nyngan, D 10591: Gin Gin, D 10603: Tor Downs, SW of Menindee, D 10610-1: Moorna, D 12167: 16 km N of Albury, D 14641-2: Savernake Station, Savernake, D 15043-8; D 15061-3: Boat Rock Hill, Savernake, D 15065-6: 8 km S of Corowa, D 15067-77: 6½ km SW of Savernake, D 15081: Mulwala, D 15086-7: Warrumbungle National Park, D 15091: 6½ km S of Morandah, D 15092: 14½ km NE of Urana, D 15130: 3 km NE of Jerilderie, D 15131: 14½ km NE of Jerilderie, D 15132: 3 km N of Tocumwal, D 15133: Tocumwal, D 15134: 10 km N of Cowra, D 15135: Boree Creek, D 15136-8; D 15142-5: 21 km SE of Jerilderie, D 15139-41: Sloane, D 15146: 13 km SE of Jerilderie, D 15147: 10 mls N of Barham, D 15178-92: 90 km W of Wentworth, D 15850: 24 km NNE of Wentworth, D 40180-1: *Victoria* (AM) Browns Plains, R 3988: (NMV) Murray River, D 917: Ouyen, D 810-1; D 950: Mildura, D

848; D 15218-9: Victoria, D 945: Elmore, D 1002: Bright, D 1065; D 1067; D 1069: Templestowe (in error) D 1237: Dimboola, D 1724; D 2207: Goulburn Valley, D 1808: Glenrowan, D 1819; D 2517: near Melbourne (in error) D 2508: Cowangie, D 2717: Grampians, D 3315-6: Kewell, D 3321-3: Red Cliffs, D 7966; D 7968: Sea Lake, D 9104-5: Pink Lakes, Linga, D 10713: Birthday Tank, Sunset Country, D 11185-6; D 33305; D 44865; D 47407: Wood Wood, D 13948-9: Taminiek Gap, Warby Ranges, D 14553-63; D 14573-5: Warby Ranges, D 14610: Specimen Hill, Byawatha, D 14635: 8 km S of Kiata, Little Desert, D 14911-5; D 14984: 8 km SW of Kiata Little Desert, D 14953: 8 km SW of Natimuk, D 15042: Walpeup, D 15049-50: 13 km N of Underbool, D 15051-2: 10 km SE of Wyeheproof, D 15053: 13 km E of Yarrawonga, D 15082: 6½ km S of Nathalia, D 15083: 13 km S of Yarrawonga, D 15084-5: Kenmere, D 15088: 16 km SW of Nathalia, D 15089-90: Tutye, D 15097-103: Pine Plains, D 15104-5: 13 km E of Patchewollock, D 15106: Axedale, D 15108: 4 km E of Mildura, D 15109: Wemen, D 15110: 4 km NE of Wemen, D 15111: 4 km NE of Mildura, D 15112: 7 km WSW of Leitchville, D 15113-5: 35 km NW of Nyah, D 15116: Hattah, D 15117: Mildura Airport, D 15118-29: Lindsay Point Station, D 15148: 5 km E of Neds Corner Station, D 15149-53; D 15157-8: 6½ km E of Neds Corner Station, D 15154-5: 6½ km NW of Neds Corner Station, D 15156: Neds Corner Station, D 15159: Kerang, D 15160-2; D 15164: 5 km N of Eaglehawk, D 15165-6: 6½ km NE of Wahgunyah, D 15167-72: 6½ km E of Talgarno, D 15173: 29 km N of Swan Hill, D 15176: Nyah, D 15193: 3 km E of Hattah, D 15194-206: Tower Hill, Grampian Ranges, D 15208: 5 km NW of The Crater, Little Desert, D 15210-3: 6½ km N of The Crater, Little Desert, D 15209: Manangatang, D 15214-6: Tiger Hill via Tatong, D 17710-7: between Perry and Birthday Tanks, Sunset Country, D 18064-6: 1½ km E of Birthday Tank, Sunset Country, D 18076: 7 km W of Nowingi, D 18102-4: Tank, 6½ km E of

Birthday Tank, Sunset Country, D 18165: SW bank of Rocket Lake, Sunset Country, D 18168: between Monkeytail and Perry Tanks, Sunset Country, D 18173: Stockyards between Perry and Birthday Tanks, Sunset Country, D 18175-9: Stockyards, Sunset Tank, Sunset Country, D 18184-5: 5 km NE of Sunset Tank, Sunset Country, D 18233: 1 km E of Sunset Tank, Sunset Country, D 18234: 24 km E of Birthday Tank, Sunset Country, D 33304: 1 km S of Millewa South Bore, Sunset Country, D 33347: 14½ km NE of Millewa South Bore, Sunset Country, D 33350-1: Millewa South Bore, Sunset Country, D 33354: Pound Bend, Wemen via Robinvale D 33358-60: Kulkyne Freehold, D 33528-30: 6½ km SE of Pine Plains, D 33536: 5 km E of Broughton, Nhill Rd., D 33638-43: 1½ km N of Freuds Plain, Wyperfeld National Park, D 38799: Main Gate, Wyperfeld National Park, D 38800-5: 3 km W of Yanac, D 38818: Sunset Tank, Sunset Country, D 38853; D 38860-1: 3 km E of Perry Tank, Sunset Country, D 38856: 3 km N of Bendigo, D 44834-6: Mildura, D 40141-2: 11 km WNW of Annuello, D 47343-4: 11 km S of Boundary Bend, D 47354-6:

#### *Morethia butleri* (Storr 1963)

(Fig. 3)

*Ablepharus butleri* Storr, 1963, *W. Aust. Nat.* 9: 46-47.

*Morethia butleri* Smyth, 1972, *Rec. S. Aust. Mus.* 16: 1-14. Fig. 3.

Storr, 1972, *J. R. Soc. W. Aust.* 55: 73-79. Figs. 1, 2.

*Holotype*: WAM R 20615, Western Australian Museum, Perth. Locality: Leonora, Western Australia, 28° 52' S., 121° 23' E. Collectors: G. M. Storr and R. E. Moreau.

*Description*: See Storr (1963).

*Diagnosis*: Six (rarely seven) supraeiliaries, the first the largest and the remainder forming a decreasing series; junction of supraeiliaries, with supraoculars linear or slightly curved. Subdigital lamellae acutely keeled and uniearinate. Palmar tubercles apically acute.

*Description*: (After Smyth (1972) and Storr (1972)) Snout-vent length 25-56 mm. Intact tail 134-169% of snout-vent length. Suprana-

sals present, widely separated. Postnasals present but often fused to supranasals. Prefrontals separated. Frontonasal wider than long. Frontal longer than wide. Two to five ear lobules (usually two or three). Midbody scales in 26-31 rows (usually 28 or 30), mean 28.9. Lamellae under fourth toe 19-27, mean 22.4. *Colour*: Dorsal surface dark olive-green to olive-brown sometimes flecked with black, but usually unmarked. Broad black upper-lateral stripe may be distinct and well developed or virtually absent except anteriorly. The white mid-lateral stripe is equally variable, it may be distinct and well developed or only readily distinguishable anteriorly. Lips dark spotted. Storr (1972) records that the tail (as with *M. boulengeri*) is red in juveniles and brown in adults.

*Distribution*: Arid and semi-arid parts of S Western Australia and possibly SW South Australia S of 27° 30' S. Not known from any other part of Australia. (Figure 3.).

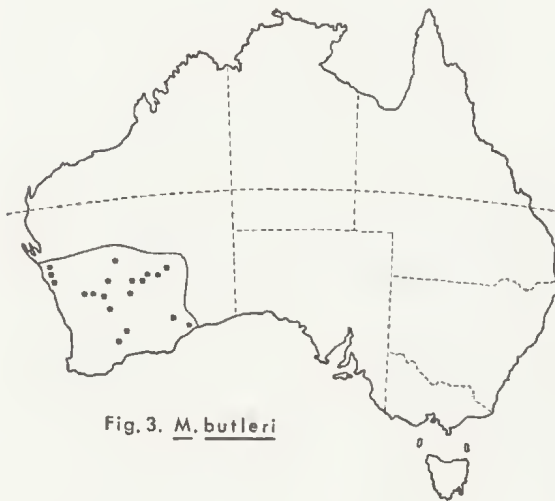


Fig. 3. *M. butleri*

*Literature Records*: See lists in Smyth (1972) and Storr (1972).

*Specimens Examined*: South Australia (NMV) Overland Railway to Western Australia, D 2654: No Data (AM) R 38652.

### *Morethia lineocellata* (Dumeril and Bibron 1839)

(Fig. 4)

*Ablepharus lineocellatus* (part) Dumeril and Bibron, 1839 *Erpetologie Generale* 5: 817. Paris.

*Morethia anomalus* (part) Gray, 1845, *Catalogue of lizards*: 65.

*Ablepharus lineocellatus* A var. *lineocellatus* Boulenger, 1887, *Catalogue of the Lizards in the British Museum (Natural History)* 3: 348-349.

*Ablepharus lineocellatus* B var. *anomalus* (part) Boulenger, 1887 *Ibid.* 3: 48-349.

*Ablepharus lineocellatus* Zietz, 1920, *Rec. S. Aust. Mus.* 1: 220-221.

*Ablepharus lineocellatus lineocellatus* Loveridge, 1934, *Bull. Mus. Comp. Zool.* 77: 377.

*Morethia lineocellata* Fuhn, 1969, *Z. Zool. Syst. Evolutionsforsch.* 7: 67-76. Fig. 7.

*Morethia lineocellata* Storr, 1972, *J. R. Soc. W. Aust.* 55: 73-79. Figs. 1, 3.

#### Type Series of *Ablepharus lineocellatus*, Dumeril and Bibron, 1839

*Remarks*: Five specimens (not four as listed by Guibe, 1954) in the Museum National d'Historie Naturelle, Paris: MNHP 3092 (old number 3101). Locality: Nouvelle Hollande. No other data. Two distinct species are represented in the type series which was not examined by either Smyth or Storr. Three of the syntypes are referable to *M. lineocellata sensu* Storr. The first of these syntypes (the largest) fits Storr's definition of *M. lineocellata* in all respects, this specimen is designated as lectotype below. The second syntype has a partially separated supranasal scale which is characteristic of Storr's *M. obscura*, but not exclusive of *M. lineocellata*, this specimen otherwise fits Storr's definition of the latter species. The third syntype is aberrant, it has five supraciliaries owing to the fusion of the first and second, and it fits Storr's definition of *M. obscura* in one respect, for the third last supraciliary is the largest and the last three supraciliaries form a rapidly decreasing series. However, this specimen lacks supranasal scales which are characteristic of *M. obscura*. The remaining two syntypes are conspecific and distinct from either *M. lineocellata* or *M. obscura*; both specimens are readily referable to *Menetia greyi* Gray 1845 (see below).

In order to restrict the use of the name *Morethia lineocellata* and preserve Storr's



nomenclature, the first syntype listed above which fits Storr's definition exactly is selected as lectotype here.

*Lectotype*: MNHP 3092 (Old No. 3101), Museum d'Historie Naturelle, Paris.

*Locality*: Nouvelle Hollande (=Australia). No other data.

*Description*: Snout-vent length 42 mm. Tail (intact) 51 mm, 121% of snout-vent length. Length of forelimb, 12 mm; length of hindlimb, 18 mm. Snout-axilla, 10 mm; axilla-groin, 24 mm. Six supraciliaries, third, fourth and fifth subequal in size and penetrating deeply between the supraoculars; sixth supraciliary the smallest. Supranasals fused to nasals. Postnasals present. One ear lobule. Seven upper labials, the fifth largest and entirely subocular; six lower labials. One pair of nuchals. Eight preanals, four slightly enlarged. Smooth scales, 26 rows round midbody. Subdigital lamellae smooth, 19 under the fourth toe. Palmar tubercles apically rounded.

*Colour*: Dorsal surface olive-brown with two rows of rather indistinct black and white ocelli. Dorsolateral row of indistinct black and white ocelli. Black upper lateral band runs from nostril through the eye, above the forelimb and along trunk to tail. Distinct white mid-lateral stripe runs from upper lip through ear and above fore and hind limbs to tail. Black lower lateral band runs below white mid-lateral stripe, merges into grey lower lateral region. Ventral surface pure white unmarked.

*Paralectotypes*: Four specimens also under MNHP 3092 (Old No. 3101), Museum d'Historie Naturelle, Paris.

*Locality*: Nouvelle Hollande. No other data.

*Paralectotype (a)*: Snout-vent length 35 mm; tail (regrown) 41 mm; length of forelimb 11 mm; length of hindlimb 16 mm; snout-axilla 13 mm; axilla-groin 20 mm. Scallation as for lectotype except: supranasal only partially separated from nasal; 24 rows of scales round midbody; 18 lamellae under the fourth toe; ten preanal scales, four slightly enlarged. Colour as for lectotype except: each of the two dorsal rows of black and white ocelli have fused to give continuous white lines margined

by broken black lines on the trunk and tail; and on each side the dorsolateral row of ocellations have also fused to give a continuous white dorsolateral stripe margined above and below on the trunk by black. This specimen is conspecific with the lectotype.

*Paralectotype (b)*: Snout-vent length 41 mm; tail (regrown) 19 mm; length of forelimb 11 mm; length of hindlimb 17 mm; snout-axilla 9 mm; axilla-groin 20 mm. Scallation as for lectotype except: five supraciliaries owing to the fusion of the first and second, second and third the largest, only the second and third penetrate deeply between the supraoculars, and the third, fourth and fifth form a rapidly decreasing series (this condition which resembles that in *M. obscura* is apparently caused by abnormal reduction of the fourth supraciliary); 26 rows of scales round midbody; 20 lamellae under the fourth toe; five lower labials. Colour as for lectotype. Supranasal scales fused to nasals. If Storr is correct that supranasals are invariably present in *M. obscura*, this specimen is conspecific with the lectotype.

*Paralectotype (c)*: This specimen is neither conspecific nor congeneric with the lectotype, and it differs in the following characters: snout-vent length 29 mm; tail (broken) 5 mm; length of forelimb 6 mm; length of hindlimb 9 mm. Four fingers and five toes. Scallation greatly different: all supraciliaries fused into a single elongate shield; two supraoculars, the anterior very large and elongate, the posterior small; 18 scale rows round midbody; 16 lamellae under the fourth toe. Colour as for *Menetia greyi* Gray (see Boulenger 1887). This specimen is conspecific with the syntypes of *Menetia greyi* Gray (BMHN X.1.7. a-e; RR 1946.8.15.1-14 and 1946.8.16.88-99) and is referable to that species.

*Paralectotype (d)*: Description as for paralectotype (c) except: snout-vent length 27 mm; tail (broken) 3 mm; length of forelimb 6 mm; length of hindlimb 9 mm; 18 scale rows round midbody; 17 lamellae under the fourth toe. This specimen, is also conspecific with the syntypes of *Menetia greyi* Gray (see above) and is referable to that species.

Type Series of *Morethia anomalus* Gray, 1845

*Remarks:* Gray (1845) described this species from two specimens in the British Museum collection (BMNH) XI.6a-b; RR 1946.8.15.74-75). Storr (1972) designated one (BMNH XI. 6b; RR 1946.8.15.75) as lectotype, thus making *M. anomalus* a junior subjective synonym of *M. lineoocellata*, but did not comment on the identity of the other syntype. The author has re-examined Gray's two syntypes and determined that they belong to different species: the lectotype is conspecific with the lectotype of *M. lineoocellata* which is designated and described above; but the paralectotype is conspecific with Storr's (1972) *M. obscura* described at the same time that the lectotype of *M. anomalus* was designated.

*Lectotype:* Storr (1972): BMNH XI.6b; RR 1946.8.15.75, British Museum of Natural History, London. Locality: West Australia. Collector: Mr. Gilbert. No other data.

*Description:* Snout-vent length 43 mm. Tail (intact) 63 mm, 149% of snout-vent length. Length of forelimb, 11 mm; length of hindlimb, 17 mm. Snout-axilla 9 mm; axilla-groin, 25 mm. Six supraciliaries, third, fourth and fifth equal in size and penetrating deeply between the supraoculars; sixth supraciliary the smallest. Supranasal separate from nasal. Postnasals present and separate from supranasal. One ear lobule. Eight upper labials, sixth the largest and entirely subocular; seven lower labials. One pair of nuchals. Eight preanal scales, four slightly enlarged. Smooth scales, 26 rows round midbody. Subdigital lamellae smooth, 20 under the fourth toe. Palmar tubercles apically rounded.

*Colour:* Very faded due to preservation. Dorsal surface light brown, ocellations not visible. Light dorsolateral stripe faintly visible. Black upper lateral band and white midlateral stripe faintly visible. Ventral surface unmarked, white.

This specimen is conspecific with the lectotype of *M. lineoocellata* (MNHP 3092) described above. As Storr (1972) did not examine the syntypes of *M. lineoocellata* when he designated the lectotype of *M. anomalus* and placed it in the synonymy of *M. lineoocellata*, his decision was apparently based only on the

written description of the latter species. The author has examined Storr's lectotype of *M. anomalus* and found it to be conspecific with the lectotype of *M. lineoocellata* so Storr's action is now verified.

*Paralectotype:* BMNH XI.6a; RR 1946.8.15.74, British Museum of Natural History, London. Locality: West Australia. Collector: Mr Gilbert. No other data.

*Description:* Snout-vent length 50 mm. Tail (broken) 7 mm. Length of forelimb, 12 mm; length of hindlimb, 19 mm. Snout-axilla, 15 mm; axilla-groin 30 mm. Six supraciliaries, fourth the largest and fourth, fifth and sixth form a rapidly decreasing series; the third and fourth supraciliaries penetrate deeply between the supraoculars. Supranasals separate from nasals. Postnasals present and separate from supranasals. Three ear lobules. Seven upper labials, fifth largest and entirely subocular; six lower labials. One pair of nuchals. Eight preanal scales, four slightly enlarged. Smooth scales, 26 rows round midbody. Subdigital lamellae smooth, 18 under the fourth toe. Palmar tubercles apically rounded.

*Colour:* Very faded due to preservation. Dorsal surface light olive-grey, ocellations not visible. Black upper lateral band faintly visible. Ventral surface unmarked, white.

This specimen is not conspecific with the lectotype of *M. lineoocellata*, but it is conspecific with Storr's species *M. obscura* (see below) and fits Storr's description of that species exactly.

*Diagnosis:* Six supraciliaries (occasionally five owing to fusion of first and second), the third, fourth and fifth subequal and penetrate deeply between the supraoculars; the sixth supraciliary the smallest. Supranasals usually fused to the nasals. Subdigital lamellae smooth or obtusely keeled. Palmar tubercles apically rounded.

*Description:* (After Smyth (1972) and Storr (1972)). Snout-vent length 19-49 mm. Intact tail 111-247% of snout-vent length. Supranasals normally fused to nasals or separated only by a shallow or incomplete groove. Postnasals normally present but only separated from nasal by a faint groove. Frontonasal wider than

long. Frontal longer than than wide. One to three car lobules. Midbody scales in 24-31 rows (usually 26 or 28), mean 27.3. Lamellae under the fourth toe 16-26, mean 19.7.

**Colour:** Head coppery brown. Dorsal surface green, olive-grey or olive-brown, usually marked with white ocelli outlined in black. Ocelli may be absent or modified into black or white spots which sometimes fuse into longitudinal stripes. White dorsolateral stripe present. Irregular dark brown or black upper lateral band. White midlateral stripe margined by black below usually well developed, runs through ear, over forelimb and along trunk to hindlimb. **Distribution:** On the mainland restricted to two coastal areas in the SW of Western Australia: the mid-west coast from Port Cloates S to Geraldton; and the lower W coast from just N of Perth S to Cape Leeuwin and a short distance inland. Also occurs on islands of the Montebello Group and Houtmans Abrolhos, and from Rottnest and Garden Islands. Distribution inland very limited. Not known from any other Australian state. (Figure 4.).

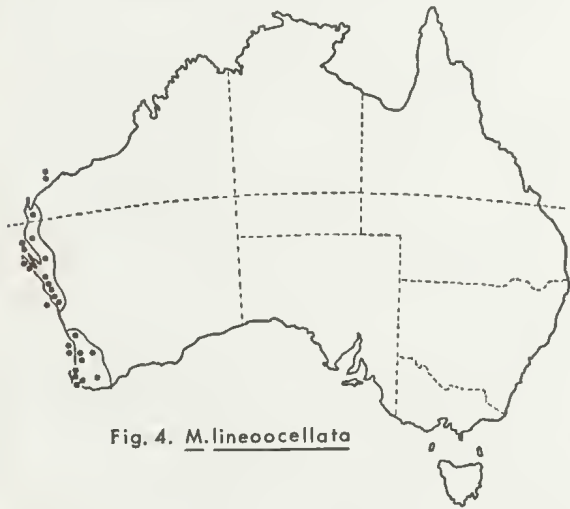


Fig. 4. *M. lineoocellata*

**Literature Records:** See list in Storr (1972).  
**Specimens Examined:** Western Australia (AM) Bunbury, R 30343; (QM) Rottnest Island, J 12241:

***Morethia obscura* Storr 1972**

(Fig. 5.).

*Morethia anomalus* (part) Gray, 1845, *Catalogue of lizards*: 65.

*Ablepharus lineoocellatus* B var. *anomalus* (part) Boulenger, 1887, *Catalogue of the Lizards in the British Museum (Natural History)* 3: 348-349.

*Ablepharus lineoocellatus* (part) Zietz, 1920, *Rec. S. Aust. Mus.* 1: 220-221.

*Ablepharus lineoocellatus anomalus* (part) Loveridge, 1934, *Bull. Mus. Comp. Zool.* 77: 377-378.

*Morethia lineoocellata* Smyth, 1972, *Rec. S. Aust. Mus.* 16: 1-14. Figs. 4, 6.

*Morethia obscura* Storr, 1972, *J. R. Soc. W. Aust.* 55: 73-79. Figs. 1, 3.

**Holotype:** WAM R 16916, Western Australian Museum, Perth. Locality: 6 miles east of Kalamunda, Western Australia, 31° 58' S, 116° 08' E. Collector: Mr John Dell. Date of collection: November 7, 1962.

**Description:** See Storr (1972).

**Remarks:** *M. obscura*, described by Storr in 1972, is very closely related to *M. lineoocellata*. Neither Smyth nor Storr examined the syntypes of *M. lineoocellata* though both used the name in their reviews. Smyth recorded and described specimens from South Australia under this name. However, he expressed reservations as he noted that South Australian specimens differed from many Western Australian specimens in several respects viz.: the invariable possession of supranasal scales; having the fifth supraciliary smaller than the fourth; and having only the third and fourth supraciliaries penetrate between the supraoculars. Smyth noted that Gray (1845) described *M. anomalus* from 'W Australia' and distinguished it from *M. lineoocellata* because the former, but not the latter, had supranasal scales. Smyth did not use the name *M. anomalus* for South Australian specimens as he doubted that the presence or absence of supranasal scales on its own was a good indication of a species. He suggested that a careful study of Western Australian material was needed as both *lineoocellata* forms occurred there and stated that this could result in the recognition of two species. Storr carried out such a study and separated the new species *M. obscura* from *M. lineoocellata* using the condition of the supraciliaries described by Smyth and the presence of supranasal scales as the major diagnostic characters. All eastern Australian specimens, including those described by Smyth as *M. lineoocellata*, have proved to be *M. obscura*.

The nomenclature of the species presently recognized in the genus *Morethia* has now become very confused, especially in the *lineoocellata* group. Literature records of *M. lineoocellata* prior to Smyth and Storr could include any, or all, of the 'southern' species of *Morethia* and should be disregarded unless they can be verified. Particularly confusing is the history of the species *M. anomalus* described by Gray (1845) from Western Australia. As mentioned above, Gray distinguished the species from *A. lineoocellatus* because it possessed supranasal scales. Boulenger (1887) after examining material in the British Museum which included Gray's types of *M. anomalus*, applied the name *Ablepharus lineoocellatus anomalus* to specimens with supranasal scales. Authors from that time mainly followed Boulenger (e.g. Loveridge, 1934 and used the name *anomalus* for the more eastern populations of *M. lineoocellata* which possess supranasal scales (i.e. Storr's *M. obscura*), though, as Smyth notes, most authors were probably also including *M. adelaidensis* and *M. boulengeri* under this name. As recorded above, there were two syntypes of Gray's *M. anomalus*, the lectotype (BMNH XI. 6b, RR 1946.8.15.75) which is conspecific with *M. lineoocellata sensu stricto*, and the paralectotype (BMNH XI.6a, RR 1946.8.15.74) which is conspecific with Storr's new species *M. obscura*. The name *M. anomala* could have been retained if the paralectotype had been nominated instead as lectotype for the taxon. This would also have preserved recent usage of the name. It is unfortunate that the name *anomalus* has been placed in the synonymy of *M. lineoocellata* and a new name, *M. obscura*, has been introduced. It must be stressed again that in Smyth's review, the name *M. lineoocellata* was applied to specimens which now properly belong in Storr's species *M. obscura* and all Smyth's descriptions etc. apply to this latter species.

**Diagnosis:** Six supraciliaries (rarely five owing to the fusion of the first and second), fourth the largest, and the fourth, fifth and sixth form a rapidly decreasing series, the third and fourth (and rarely the fifth) penetrate between the supraoculars, sixth the smallest. Supranasals

invariably present. Subdigital lamellae smooth or obtusely keeled and uncarinate; palmar tubercles apically rounded.

**Description:** Snout-vent length 18-56 mm, mean 43 mm. Total length of adults with intact tails 107-129 mm, mean 117 mm. Intact tail 120-189% of snout-vent length. Supranasals and postnasals always present but often fused to each other or only separated by a shallow groove. Supranasals widely separated. In most specimens the third and fourth supraciliaries penetrate between the supraoculars, the fourth is largest, and the fourth, fifth and sixth are successively smaller; but rarely the fifth supraciliary is nearly as large as the fourth and it also penetrates between the supraoculars. Frontonasal wider than long. Frontal longer than wide. One pair of nuchals. One to four ear lobules. Midbody scales in 24-31 rows (usually 26 or 28), mean 27.7. Lamellae under the fourth toe 14-23, mean 19.0.

**Colour:** Olive-brown to olive-grey dorsal surface, usually with dorsal ocellations which consist of a single scale with the middle third white and the outer thirds black. The dorsal ocellations are rarely bold or numerous, and may be reduced to black flecks or be absent altogether. Occasionally there is a trace of a pale dorsolateral stripe. Broad irregular black upper lateral stripe. Narrow pale irregular mid lateral stripe usually present, running from eye through ear over forelimb and back to hindlimb. The upper lateral and mid lateral stripes are not as even or bold as those in *M. boulengeri*.

**Distribution:** Arid and semi-arid areas of SW New South Wales; NW Victoria; S South Australia and offshore islands; and S Western Australia. (Figure 5.).

**Literature Records:** See lists in Smyth (1972 as *M. lineoocellata*) and Storr (1972).

**Specimens Examined:** *Western Australia:* (AM) Perth, R 2457; Western Australia, R 6483; Bornham, R 7689; Cranbrook, R 7690; Merredin, R 9152; Eradu near Geraldton, R 9164; Woodlands, Tambellup, R 11121; R 11666; Northam, R 12350; *South Australia:* (NMV) Purnong, D 1546-51, D 3076; Lake Wangary, Eyre Peninsula, D 15058; *New South*

Wales: (AM) Nymangee, R 17675; Round Hill Fauna Reserve between Lake Cargelligo and Mt. Hope, R 27860; R 27869; R 27823-4; R 27833; R 27838; R 27883-4; R 29670-1; 8 km W of Nymangee, R 18481: *Victoria*:



Fig. 5. *M. obscura*

(NMV) Raak Plains D 698; Ouyen, D 1040; D 2416; Red Cliffs, D 7969; Kiata, Little Desert, D 8958; Pink Lakes near Ouyen, D 9473-4; Kooloonong, D 13951; Broughtons Waterhole, Little Desert, D 14917-29; 1½ km NE of Broughtons Waterhole, D 14930-1; D 14937; 8 km S of Broughtons Waterhole, D 14932-3; D 14935; D 14942-3; D 14945; D 14947-8; 1½ km E of Broughtons Waterhole, D 14934; D 14936; D 14940; D 14944; D 14946; 1½ km W of Broughtons Waterhole, D 14938; 5 km E of Broughtons Waterhole, D 14939; 3 km NNE of Broughtons Waterhole, D 14941; Stan's Camp, Little Desert, 22½ km SW of Nhill, D 14949-50; 16 km N of Goroke, Little Desert, D 14951-2; 14½ km S of Murrayville, D 18235; Spring, 48 km S of Murrayville, D 18236; SA-Vic. border due W of Telopea Downs, Big Desert, D 38819; Red Bluff, Big Desert, D 38822; D 40174-5; The Springs, Big Desert, D 38831; 15 km E of Broughton, NW of Nhill, D 44866; 6 km S of Dimboola, D 44867; Little Billy Bore, Big Desert, D 47392-3: *No accurate data* (AM) R 39455.

## Ecology

Detailed laboratory studies have been made only on *M. boulengeri*. Field observations show *M. adelaidensis* and *M. obscura* to be similar to *M. boulengeri* and, from the distributions of *M. butleri* and *M. lineoocellata*, it is considered that they would also be broadly similar.

*M. boulengeri* is a heliothermic, insectivorous skink. The species has high thermal preferences compared to other skinks from other temperate areas (Rawlinson, 1974 a,b; 1975). The voluntary minimum temperature is 29.95°C, the mean preferred temperature is 34.09°C, and the voluntary maximum temperature is 39.35°C.

Habitat preferences have not received any detailed attention. However, it is possible to state that all species live in open vegetation forms ranging from semi-desert to woodland. *Morethia* species are generally restricted to areas where mean annual rainfall is less than 50 cm.

## Reproduction

*M. adelaidensis*, *M. boulengeri* and *M. obscura* are all oviparous, but details are known only for *M. boulengeri*. Unlike the majority of lygosomid skinks from cool temperate areas, this species does not show obligatory sperm storage overwinter (Rawlinson, 1974 b). Ovarian and testicular activity commences in early spring (September to October) and ovulation occurs in late October to early November. Copulation and fertilization also occurs at this time. The fertilized eggs are retained in the oviducts until late January or early February when they are laid in an advanced state of development. Clutch size varies from 3 to 5 with a mean of 3.5 (11 observations).

## Relationships

There is no doubt that the five southern species of *Morethia* are all closely allied and that with the northern (*M. taenioleura*) group they form a good genus. The relationships of the genus have been discussed several times recently (see Greer 1974 and included authors). Greer recorded that the *Morethia* species have an 'alpha' lygosomid palatal bone pattern that

fits them into his 'Group II' of *Leiolopisma*-like genera. On this basis he concluded that the closest Australian genera are *Anotis*, *Cryptoblepharus*, *Emoia*, *Leiolopisma* and *Pseudemoia* (though he included the latter genus in *Leiolopisma*) and the present author agrees fully with this finding. However, using morphological criteria, Greer went on to construct a phylogeny in which the 'Group II' *Leiolopisma*-like genera were derived from an ancestral species close to *Pseudemoia spenceri* (which he placed in the genus *Leiolopisma*). Greer considered the genus to be the end of an evolutionary line that ran from a *Pseudemoia spenceri*-like ancestor through *Emoia* to *Cryptoblepharus* then *Morethia*. In a second lineage Greer considered that the genera *Anotis* and *Proablepharus* arose from *Leiolopisma* via the same *Pseudemoia spenceri*-like ancestor. The present author considers this phylogeny to be unlikely as it involves the evolution of five oviparous genera (*Anotis*, *Cryptoblepharus*, *Emoia*, *Morethia* and *Proablepharus*) through two groups (*Pseudemoia* and *Leiolopisma*) that are placental, viviparous forms. Until full details of the biology and morphology of all 'Group II' *Leiolopisma*-like species are known, their origins, relationships and phylogeny must remain doubtful.

### Discussion

The five southern species of *Morethia* present an interesting pattern of speciation in the temperate arid and semi-arid areas of Australia. However, until further details of the ecology of the various species are known, it is not possible to meaningfully comment on their biogeographic and evolutionary significance. When these details are known, the group will provide a radiation pattern to compare and contrast with other related lygosomid groups, the more mesic temperate genera *Lampropholis*, *Leiolopisma* and *Pseudemoia*, and the tropical genera *Anotis*, *Cryptoblepharus* and *Carlia*.

### Acknowledgements

The author thanks Dr H. G. Cogger of the Australian Museum, Mr A. J. Coventry

of the National Museum of Victoria, and Ms J. Covacevich and Mr G. Ingram of the Queensland Museum, for help in locating specimens in the collections under their care. Ms A. Grandison, Dr E. Arnold and Mr A. Stimson of the British Museum of Natural History in London, Professor J. Guibe of the Museum National d'Historie Naturelle in Paris and Dr G. Peters of the Zoologisches Museum der Humboldt in Berlin all gave invaluable assistance in the location and examination of type specimens and associated data. Finally the author wishes to express sincere appreciation for the help given by various staff members of the National Museum of Victoria, especially to Mr A. J. Coventry and Mr T. A. Darragh for assistance with the manuscript and Mr J. McNally for allowing the facilities of the Museum to be used during the collection of data.

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