REDESCRIPTION AND ECOLOGY OF THE ENDEMIC TASMANIAN SCINCID LIZARDS *LEIOLOPISMA MICROLEPIDOTUM* AND *L. PRETIOSUM*

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(with four tables, three text-figures and two plates)

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Two species of scincid lizard, both hitherto identified as *Leiolopisma pretiosum*, occur syntopically on Mt Wellington, near Hobart, Tasmania. One of these is conspecific with the holotype of *Mocoa pretiosa* O'Shaughnessy, 1874, while the other is conspecific with the holotype of *Mocoa microlepidota* O'Shaughnessy, 1874, which has been regarded as a synonym of *L. pretiosum* since 1887. The two species are redescribed as members of an endemic Tasmanian subgroup within the Australian radiation of the genus *Leiolopisma* (*sensu* Greer 1982). *Leiolopisma microlepidotum* is confined to disjunct alpine populations in the south and west of Tasmania. It differs from *L. pretiosum* in colour pattern, larger size and more robust, less depressed head and body. Aspects of the biology and ecology of these and other Tasmanian endemic *Leiolopisma* species are also discussed.

Key Words: lizards, Scincidae, *Leiolopisma*, taxonomy, ecology, distribution.

INTRODUCTION

In 1874, O'Shaughnessy published descriptions of several new lizard species based on specimens received by the British Museum (Natural History) (BMNH). Amongst these were two specimens from Tasmania, which became the types of new species of the scincid genus *Mocoa* Gray, 1845; *M. pretiosa* and *M. microlepidota*. Boulenger (1887) transferred all *Mocoa* species to his section *Liolepisma* of the genus *Lygosoma*. Based on the holotypes, Boulenger relegated *Lygosoma microlepidotum* to the synonymy of *L. pretiosum*, and provided illustrations of the specimens under this new combination (pl.1). Since this time, the synonymy of *L. microlepidotum* with *L. pretiosum* has remained unchallenged (e.g. Cogger *et al.* 1983), while the generic placement of *pretiosa* has varied (Smith 1937, Mittleman 1952, Greer & Parker 1968), although it has remained closely associated with other Australian species placed in the genus *Leiolopisma* Duméril & Bibron, 1839 (Rawlinson 1974a,b, 1975, Greer 1974, 1979, 1982, Cogger *et al.* 1983). Greer (1979) placed *Leiolopisma* in the *Eugongylus* group (*Eugongylus* subgroup) of the subfamily Lygosominae (Greer 1970).

Field work in Tasmania in the late 1960's (PAR) and mid 1970's (MH) revealed the presence of distinctive high altitude populations of *Leiolopisma pretiosum*. More recently Greer (1982) has noted the morphological peculiarities (larger size, smaller scales) of *L. pretiosum* from the summit of Mt Wellington compared with lower altitude populations from other parts of Tasmania. In January 1980, MH and PR carried out field work in Tasmania as part of studies on the relationships and ecology of Australian skinks. During this time, collections were made of both the larger, small-scaled form of *L. pretiosum* on the summit of Mt Wellington, and the smaller, large-scaled form from lower down the mountain. At one site both forms were found together, literally on adjacent rocks. There was no sign that the two forms were intergrading with each other or with other *Leiolopisma* species (*L. metallicum* and *L. ocellatum*) which were also present. This indicated that two biological species were included under the name *L. pretiosum*.

During 1973, PAR made a detailed examination of O'Shaughnessy's types in the BMNH collection. Based on this, it is now clear that the holotype of *M. pretiosa* is a specimen of the smaller, "lowland" form, while the holotype of *M. microlepidota* is a specimen of the larger "highland" form. Thus Boulenger was incorrect in synonymising *Lygosoma pretiosum* and *L. microlepidotum*, and

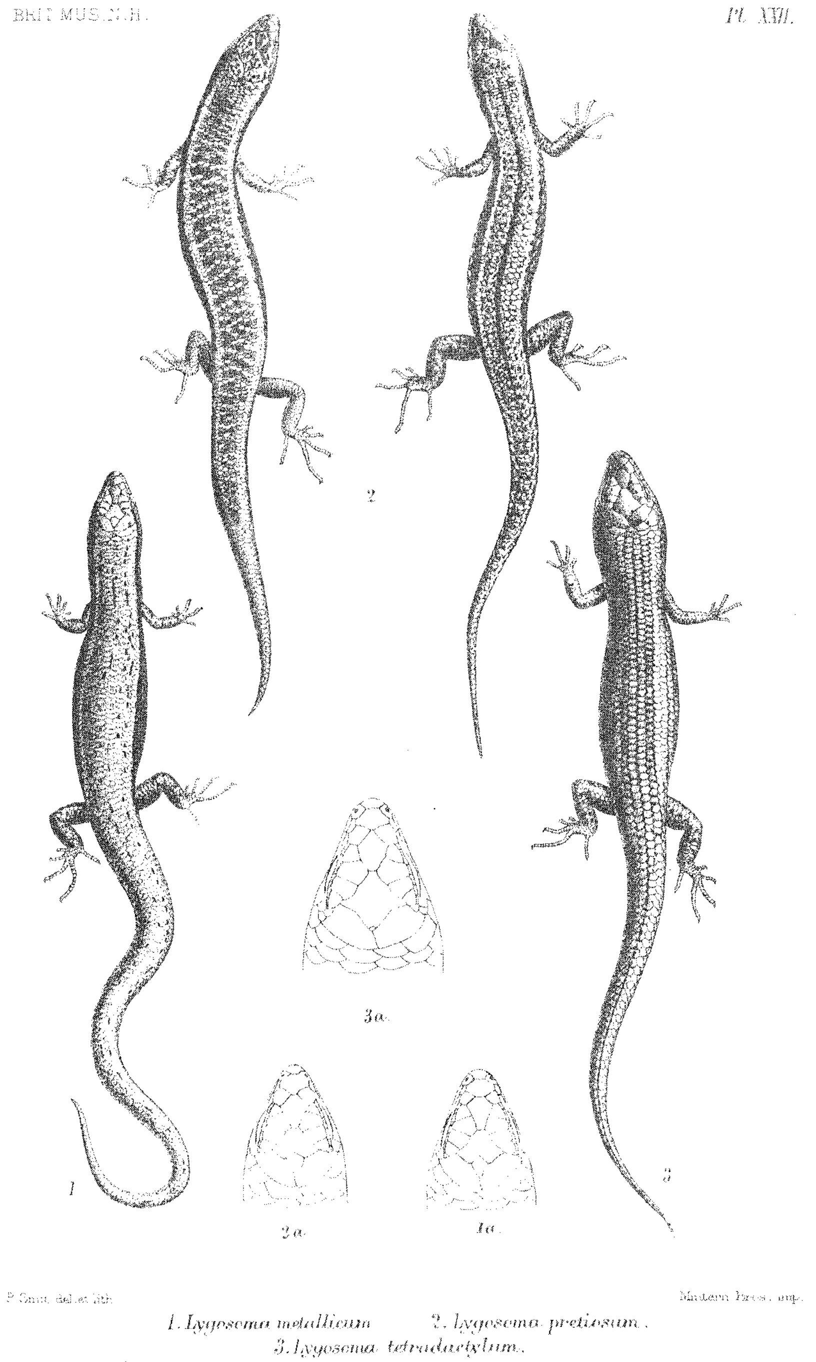

PLATE 1

Plate XXII from Boulenger (1887), which illustrated O'Shaughnessy's types of Mocoa microlepidota *(fig. 2, left) and* M. pretiosa *(fig. 2, right). The two were synonymised by Boulenger under the combination* Lygosoma pretiosum. *Reproduced by permission of the British Museum (Natural History).*

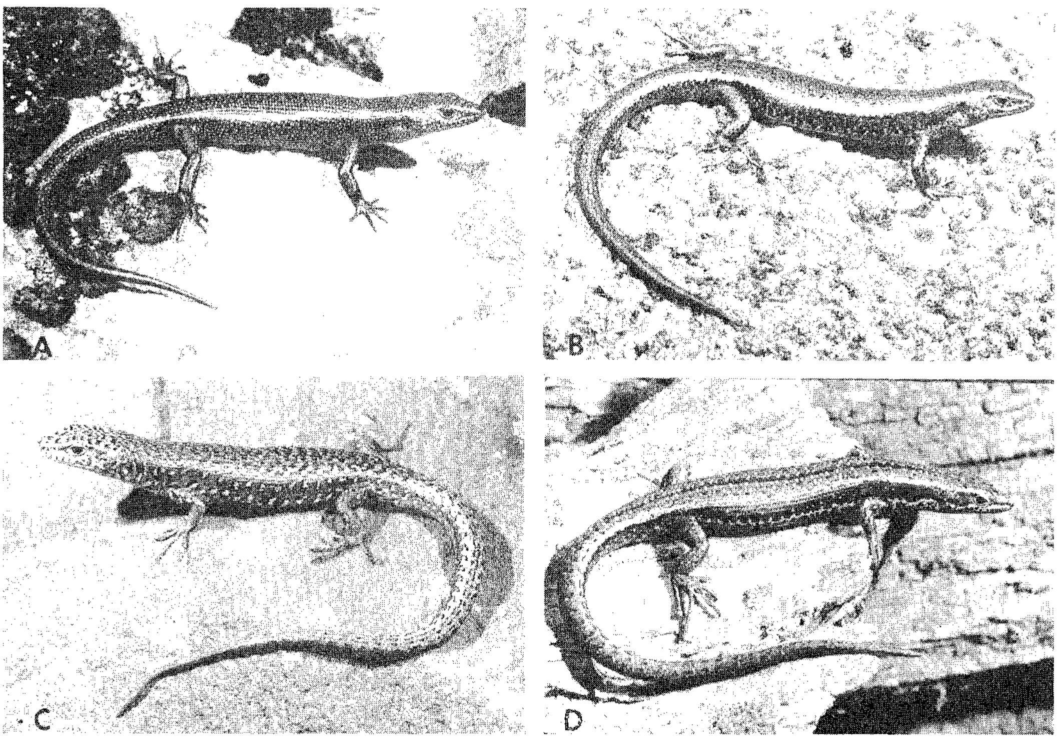

PLATE 2
Four species of Leiolopsima endemic to mainland Tasmania. (A) L. greeni, *ad. male, Mt Barrow; (B)* L. microlepidotum, *ad. male, Mt Wellington; (C)* L. ocellatum, *ad. male, Cataract Gorge, Launceston; (D)* L. pretiosum, *ad. male, Cataract Gorge, Launceston.*

the species are redescribed based on the types and on specimens in Australian museums and in the collection of Tasmanian material currently under study by PR.

Both species have distinctive insular populations which have generated an unusual amount of intraspecific variation. In the case of *Leiolopisma pretiosum*, which is continuously distributed on the Tasmanian mainland, the insular populations are literally on continental islands off the southwest and northwest coasts of Tasmania. In the case of *L. microlepidotum*, the "islands" are disjunct areas of alpine habitat, generally above 1000 m elevation. Ecological notes are provided for both species, and comparative reproductive data are provided for these and two other mainland Tasmanian endemic *Leiolopisma* species, *L. greeni* and *L. ocellatum*.

Recently, Hutchinson *et al.* (1988) described a new species, *L. orocryptum*, from southwest Tasmania, in the course of which comparisons were made with both *L. pretiosum* and *L. microlepidotum*. The present paper, which was intended to have appeared first, provides the justification for treating the latter two as distinct.

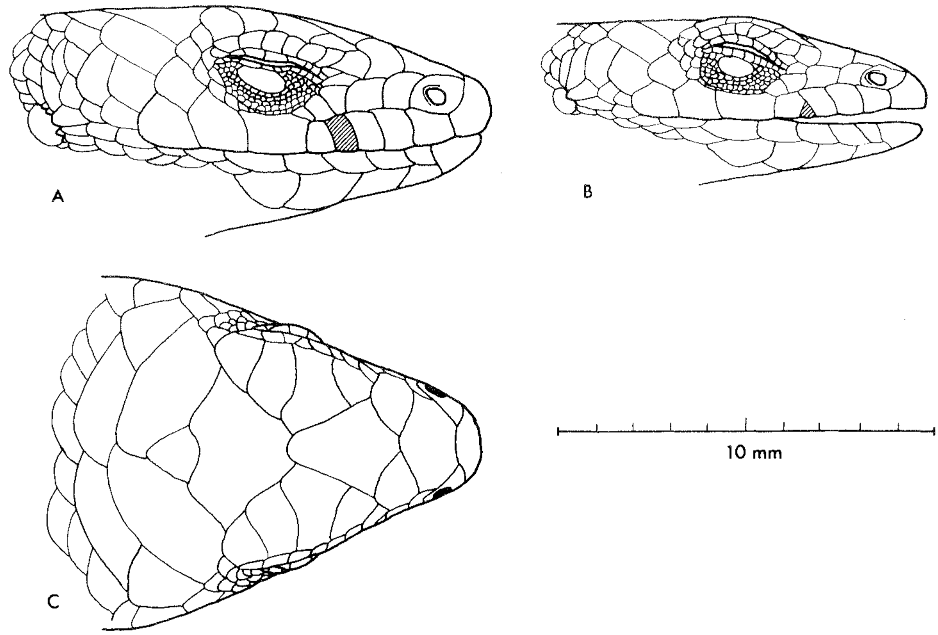

FIG. 1 — Lateral views of head scalation. (A) Leiolopisma microlepidotum *(female, Mt Wellington pinnacle, PR TF69, SVL 62 mm); (B)* L. pretiosum *(female, Mt Wellington "chalet", PR TF10, SVL 50 mm); in both species, the cross-hatched supralabial may be complete, giving a total of 8 supralabials, incomplete, as in (B) or absent, giving a total of 7 supralabials. (C) dorsal view of head scalation in* L. microlepidotum *(same specimen);* L. pretiosum *similar.*

METHODS

Definitions of head shields and measurement positions are as described by Greer (1982). Measurements were made to the nearest millimetre using a ruler and to the nearest 0.1 mm using a calibrated microscope eyepiece or vernier calipers, from both preserved specimens (in alcohol or formalin) or from deep frozen specimens (after thawing). A list of specimens examined is given in the appendix. Institutional abbreviations follow Leviton *et al.* (1985), apart from some preserved whole specimens and osteological specimens in the collections of PR and MH respectively.

Skulls were prepared by manual dissection of the soft tissues away from the bone, using fine forceps. Drawings of skulls and head shields were made using a binocular microscope equipped with a drawing tube.

Colour notes were taken from alcohol-preserved specimens and from frozen specimens (in which ephemeral alcohol-soluble pigments were preserved), as well as from colour photographic transparencies (Kodachrome 64).

Statistical procedures were as outlined by Parker (1973).

DESCRIPTIONS OF THE TAXA

Leiolopisma Duméril & Bibron, 1839

As redefined by Greer (1974), this is a grade group of small to moderate lygosomine skinks showing all of the features of the *Eugongylus* subgroup of the *Eugongylus* group (Greer 1979; = Group II species of Greer 1974). Within the *Eugongylus* group, the Australian species of *Leiolopisma* are diagnosed by: supranasals and/or postnasals present or absent; prefrontal shields well developed,

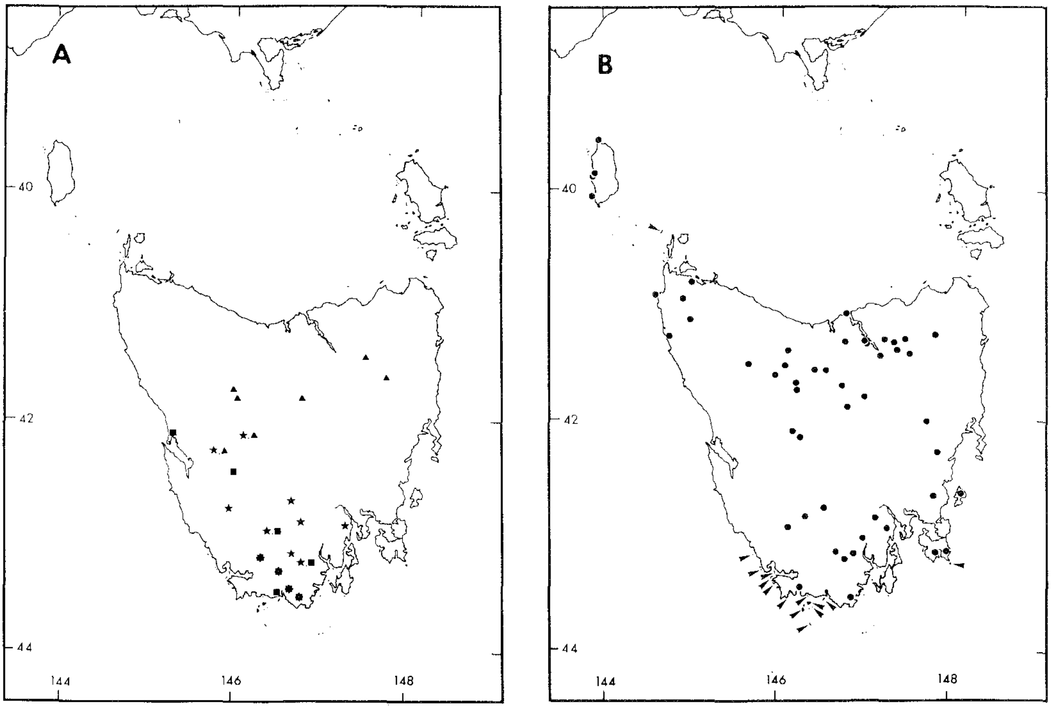

FIG. 2 — (A) distributions of the three species of alpine skinks, Leiolopisma greeni *(triangles),* L. microlepidotum *(stars) and* L. orocryptum *(squares), endemic to Tasmania; asterisks indicate populations apparently composed primarily of hybrids between* L. microlepidotum *and* L. orocryptum*; (B) distribution of* L. pretiosum *in Tasmania and its offshore islands (arrowed).*

separated or in contact; frontoparietals paired or fused, the interparietal always distinct; lower eyelid moveable with a moderate to large transparent palpebral disc; limbs well developed, pentadactyl; reproduction viviparous or oviparous.

Australian species: *baudini* Greer, 1982; *coventryi* Rawlinson, 1975; *duperreyi* (Gray, 1838); *entrecasteauxii* (Duméril & Bibron, 1839); *greeni* Rawlinson, 1975; *jigurru* Covacevich, 1984; *metallicum* (O'Shaughnessy, 1874); *microlepidotum* (O'Shaughnessy, 1874); *ocellatum* (Gray, 1845); *orocryptum* Hutchinson, Schwaner & Medlock, 1988; *palfreymani* (Rawlinson, 1974); *platynotum* (Peters, 1881); *pretiosum* (O'Shaughnessy, 1874); *rawlinsoni* Hutchinson & Donnellan, 1988; *spenceri* (Lucas & Frost, 1894); *trilineatum* (Gray, 1838); *zia* Ingram & Ehmann, 1981.

Leiolopisma microlepidotum (O'Shaughnessy, 1874) (Pls 1, 2A; figs 1A,C, 2A, 3A–C)

Mocoa microlepidota O'Shaughnessy (1874: 299).
Lygosoma (*Liolepisma*) *pretiosum* (part) Boulenger (1887: 282, pl. XXII, fig. 2 (left)).
Lygosoma (*Leiolopisma*) *pretiosum* (part) Smith (1937: 225); Worrell (1963: 47).
Lamphropholis microlepidota Mittleman (1952: 27).
Leiolopisma pretiosum (part) Greer (1974: 17); Rawlinson (1974a: 319; 1975: 10); Greer (1979: 350; 1982: 566); Cogger *et al.* (1983: 170).

Diagnosis

Leiolopisma microlepidotum is distinguished from all other Australian *Leiolopisma* species by the following combination of character states: frontoparietal single; supranasals and postnasals

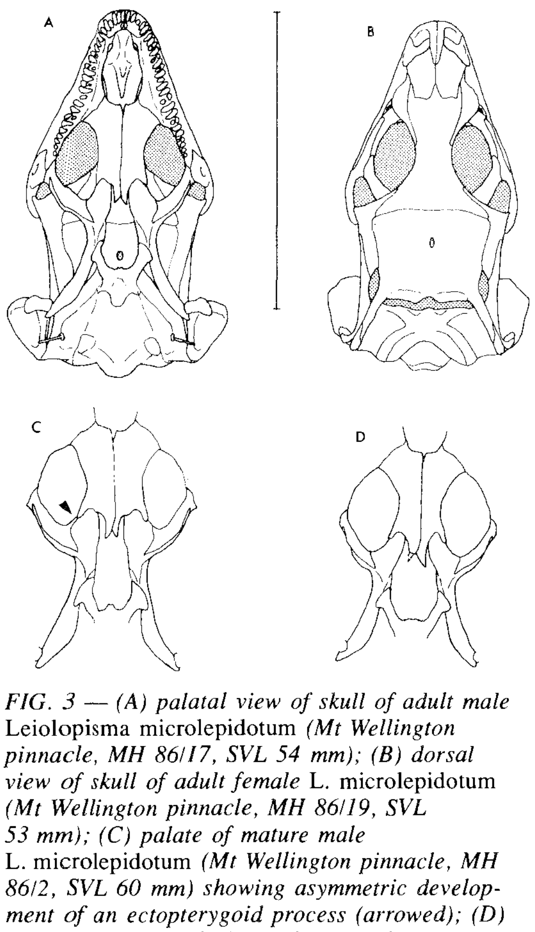

FIG. 3 — (A) palatal view of skull of adult male Leiolopisma microlepidotum *(Mt Wellington pinnacle, MH 86/17, SVL 54 mm); (B) dorsal view of skull of adult female* L. microlepidotum *(Mt Wellington pinnacle, MH 86/19, SVL 53 mm); (C) palate of mature male* L. microlepidotum *(Mt Wellington pinnacle, MH 86/2, SVL 60 mm) showing asymmetric development of an ectopterygoid process (arrowed); (D) palate of large male* L. pretiosum *(Flat Top Island, QVML 1985-3-72, SVL 58 mm).*

absent; midbody scales in 32–44 rows (modes geographically variable), dorsals smooth to weakly striate; colour pattern without well developed longitudinal stripes.

Distinguished from *L. greeni* by black upper lateral zone and tan dorsal ground colour, and fewer midbody scale rows (<38) in sympatric populations. Distinguished from *L. pretiosum* by absence of black vertebral and white midlateral stripes, larger size and less depressed head and body. Distinguished from *L. orocryptum* by absence of black vertebral and white midlateral stripes, and higher midbody scale counts (32 or more versus 32 or fewer).

Holotype

BMNH 1946.8.16.17 (old number 1867.10.1.5). Sex not determined. Van Diemens Land (= Tasmania). Collector/donor: G. Krefft. No other data. State of preservation good. The precise type locality is not specified in the BMNH records or the original description. The features of the holotype, especially the chequered colour pattern and 38 midbody scale rows, indicate that the holotype was probably collected from the Mt Wellington pinnacle, 1270 m elevation (42°56'S, 147°15'E).

Description of Holotype

Scalation

Midbody scales in 38 rows. Dorsals with three very weak striations; laterals with two weak striations. Paravertebrals not counted. Ventrals smooth, 83 between postmental and preanal (exclusive). Preanals ten, the median four slightly enlarged. Subdigital lamellae smooth, undivided, 21 under fourth toe. Supranasals and postnasals absent. Rostral and frontonasal in moderate contact. Prefrontals separated; frontal contacts frontonasal. Four supraoculars, second largest; first and second contact frontal. Frontoparietals fused. Interparietal distinct. Parietals large, in contact behind the interparietal. Each parietal bordered posterolaterally by the upper secondary temporal and enlarged nuchal. Supraciliaries seven. Upper ciliaries seven (fourth, fifth and sixth enlarged). Lower ciliaries eleven. Lower eyelid moveable, with a transparent palpebral disc. Supralabials seven, fifth subocular. Infralabials six. Ear opening obvious; no enlarged ear lobules.

Dimensions

Snout-vent length (SVL) 58 mm. Length of tail (broken) 45 mm. Length of forelimb 15 mm (26% of SVL). Length of hind limb 21 mm (36% of SVL). Length of eye 2.9 mm. Length of palpebral disc 1 mm (34% of eye length). Diameter of ear opening 0.9 mm.

Colour

Very dark brown dorsally, no dark vertebral stripe. Every third or fourth scale lighter olive brown, giving chequerboard-like pattern of pale patches. Light olive-brown dorsolateral zone runs unbroken from above eye to tail. Upper lateral zone black with two irregular rows of widely spaced small olive dots. No pale midlateral stripe, upper lateral zone merging into grey, dark-speckled, lower lateral zone. Venter unmarked pale grey.

Distribution

Leiolopisma microlepidotum is disjunctly distributed in mountainous areas in western and southern Tasmania (fig. 2A). It is known to occur as far north as Mt Rufus, and extends south at least to Mt Hartz. Most specimens have been taken from high altitude rocky herbfields, rock screes and lake margins, usually above 1000 m elevation. Far southern populations are problematic as intergradation with *L. orocryptum* is known to occur at some localities (Hutchinson & Schwaner, in prep.).

Variation

Scalation

Midbody scales in 32–44 rows, with marked geographic variation in modal counts (see below), dorsals weakly striate to smooth. Paravertebrals 61–81, again variable geographically; same size as adjacent dorsals. Subdigital lamellae on fourth toe 20–24 (mean 21.9, n=20). Postnasal and supranasal scales fused to nasal, but usually with a crescentic postnarial groove marking anterior margin of the fused postnasal. Anterior loreal single. Prefrontals usually separated (freq. 0.96). Supraciliaries usually 7 (0.85), occasionally 6, rarely 8. Supralabials seven or eight, depending on complete presence of additional supralabial between the third and fourth (see fig. 1). Asymmetry of supralabial and supraciliary counts is common. Presuboculars one or two. Temporals 1 + 2. Upper secondary temporal in contact dorsally with parietal and posteriorly with single enlarged nuchal. Postmental contacts first and second infralabials.

Dimensions

SVL of adult males 50–69 mm, adult females 51–68 mm. Hind limb 35.5–42.6 %SVL. Forelimb 25.8–32.0 %SVL. Original tail 131–147 %SVL (mean 141%, n=10). Head width sexually dimorphic in adults; range 14.1–16.3 (mean 15.0) %SVL in males, 12.4–15.6 (mean 13.6) %SVL in females.

Colour

In preservative, dorsal surfaces of head, body and tail light to dark-brown, olive or greyish. Scales of back edged and flecked with black, with dark markings more or less regularly arranged to form a crudely chequered pattern. Dorsolateral scale row (row 4) usually weakly flecked or unmarked, producing a light dorsolateral stripe. Dark markings may coalesce on the mid-dorsal line to produce a weak, ragged vertebral stripe, or may be so extensive that the dorsal pattern is better described as blackish with scattered lighter flecks (as in the holotype). Broad dark-brown to black upper lateral zone covers scale rows 5 to 8 or 9, often with small pale specks, and breaks up ventrally into a greyish, black-flecked lower lateral zone. Belly immaculate medium to light grey.

Colour in life as above, but most specimens with a greenish wash or iridescence, most obvious on the belly. Never any reddish ventral colouring.

Cranial osteology (figs 3A–C)

Postorbital bones absent and upper temporal fenestrae persistent. Prefrontals with anteriorly extending processes which reach almost to narial border, separating the maxillae and nasals. Palate typical of *Eugongylus* subgroup with palatines in contact and bearing posteromedial projections, and with pterygoids smoothly diverging along their inner margins. Pterygoid teeth absent. Vomers fused and bear a posteriorly directed triangular ridge which does not penetrate between palatines. Development of ectopterygoids variable; palatal process may be present (fig. 3C), almost excluding pterygoid from infraorbital vacuity. Premaxillary teeth eleven (five left, six right).

Leiolopisma microlepidotum (n=3) differs slightly but consistently from *L. pretiosum* (n=5) in having a higher, more robust skull, reflected by the heavier ectopterygoid bone. In two out of three skulls examined, the ectopterygoid has an anteromedial projection (the ectopterygoid process, Greer & Parker 1968) directed towards but not usually contacting the palatine; this process was absent in all *L. pretiosum*. Compared to *L. pretiosum*, *L. microlepidotum* has pterygoids which are relatively longer and with the quadrate rami disposed almost parallel to one another, rather than markedly diverging. The palatal rami of the pterygoids are also slightly expanded in *L. microlepidotum* but not in *L. pretiosum*. The larger size attained by *L. microlepidotum* is reflected in its dentary tooth counts, in which young adults have similar sized dentaries but fewer, larger teeth when compared with large adult *L. pretiosum*. Sexually mature *L. microlepidotum* have 23–27 homodont, peg-shaped teeth with obtusely pointed, slightly recurved crowns; in *L. pretiosum* the range is 26–28.

TABLE 1

Interpopulation Variation in *Leiolopisma microlepidotum*

Population	Midbody scale rows Range (mean)	Paravertebral scales Range (mean)	Adult SVL Range (n) (mm)	n
Mt Wellington	36–44 (39.3)	70–81 (76.9)	51–66 (47)	57
Mt Field	36–38 (36.7)	68–78 (73.3)	58 (1)	10
Mt Rufus	34–36 (34.9)	66–73 (70.0)	50–58 (6)	7
Mt Eliza	32–37 (34.9)	64–81 (70.9)	50–69 (29)	35
Mt Sprent	34–35 (34.2)	67–75 (70.5)	54–60 (4)	6
Mt Hartz	32–36 (33.3)	64–79 (70.4)	56–68 (17)	22

Geographic Variation

There are three distinct populations within this species, reflecting its disjunct distribution. Some of the variation characterising these populations is summarised in table 1.

Mt Wellington animals have much the smallest body scales. This is the only population known to include specimens with 40 or more midbody scale rows, and 38 and 40 are the modal midbody scale row counts for this population. Paravertebral scale counts also average much higher in this population.

To the west is the isolated Mt Field plateau, where specimens have 36 or 38 midbody scale rows and relatively high paravertebral counts. These animals are intermediate meristically and geographically between Mt Wellington and the main south-central Tasmanian highland populations, represented in table 1 by the Mt Rufus, Mt Sprent and Mt Eliza specimens. In these populations there are usually 34 or 36 midbody scale rows and about 70 paravertebrals. At Mt Rufus, where *L. microlepidotum* is sympatric with *L. greeni*, the sample of *L. microlepidotum* has smaller body sizes than average, possibly representing a case of character displacement with respect to body size. The five adult male *L. microlepidotum* were between 50 and 56 mm SVL (mean 52), while the single adult female was 58 mm. Eight adult male *L. greeni* ranged from 55 to 69 mm SVL (mean 63) while 13 females were between 59 and 70 mm (mean 65).

Southern mountain ranges (Mt Hartz area, Mt La Perouse/Precipitous Bluff and the Eastern Arthurs) support populations of skinks morphologically like both *L. microlepidotum* and *L. orocryptum*. The difficulties experienced in assigning specimens to species based on external morphology prompted the use of allozyme electrophoresis, which has resulted in the discovery that specimens from the latter two areas are mostly genetic intergrades between the two species (Hutchinson & Schwaner, in prep.). On the Mt Hartz plateau, the two species have not been recorded intergrading, but nevertheless can show confusing overlap in morphology — so much so that all specimens were initially identified as *L. microlepidotum*, while it was acknowledged that they showed apparent overlap with *L. orocryptum* (Hutchinson *et al.* 1988). Electrophoretic sorting of a sample of specimens from around Mt Hartz showed that two species, separated by four fixed genetic differences, occurred syntopically. Most could be assigned to species using external morphology as follows:

Colour pattern including a continuous white midlateral stripe and a black vertebral stripe, and/or 32 or fewer midbody scale rows .... *L. orocryptum*

Colour pattern without either a continuous white midlateral stripe or a black vertebral stripe, and/or 32 or more midbody scale rows .... *L. microlepidotum*

However, some specimens are intermediate in colour pattern, for instance combining a well-developed black vertebral stripe with an indistinct midlateral white stripe, and may have exactly 32 midbody scale rows, and so are not readily assignable to species. Pending more complete electrophoretic surveys, identification of alpine populations in far southern Tasmania will be difficult.

Leiolopisma pretiosum (O'Shaughnessy, 1874)

Pls 1, 2D; figs 1B, 2B, 3D

Mocoa pretiosa O'Shaughnessy (1874: 298).
Lygosoma (*Liolepisma*) *pretiosum* (part) Boulenger (1887: 282, pl. XXII, fig. 2 (right)).
Lygosoma (*Leiolopisma*) *pretiosum* (part) Smith (1937: 225); Worrell (1963: 47).
Lampropholis pretiosa Mittleman (1952: 29).
Leiolopisma pretiosum (part) Greer (1974: 17); Rawlinson (1974a: 319; 1975: 10); Greer (1979: 350; 1982: 566); Cogger *et al.* (1983: 170).

Diagnosis

Leiolopisma pretiosum is distinguished from all other Australian *Leiolopisma* by the following combination of character states: frontoparietal single; supranasal and postnasal scales absent; midbody scales in 32–40 (usually 32–36) rows, the dorsals smooth or striate; body and head depressed, eyes bulging markedly above flattened frontal region; white midlateral stripe usually well developed; dorsal colour pattern usually includes black vertebral stripe and both darker and lighter flecks on a brown background.

Most similar in external appearance to *L. metallicum*, *L. microlepidotum* and *L. orocryptum*. *L. metallicum* has larger scales (24–28 rows at midbody), the dorsals are often markedly striate to weakly keeled, the paravertebrals are $1^1/_2$–2 times as wide as the adjacent dorsals and the limbs are shorter (hind limb usually less than 38% of SVL, versus more than 36% in *L. pretiosum*). *L. microlepidotum* is larger (breeding adults 50–69 mm SVL versus 44–57 mm for mainland Tasmanian *L. pretiosum*), the head and body are not markedly depressed and there is no white midlateral stripe. *L. orocryptum* has larger scales (28–32 rows at midbody) and never has pale dorsal speckling.

Holotype

BMNH 1946.8.16.54 (old number 1845.5.2.10). Sex not determined. Van Diemens Land (= Tasmania). Collector: Ronald Gunn. No other data. State of preservation moderate, skin slipping from some areas. The precise type locality is not specified in the BMNH accessions book, catalogue or original description. The features of the type specimen fall within the normal range of variation for mainland Tasmanian specimens, and the species is common in the vicinity of both Hobart and Launceston, so that it is not possible to suggest a more precise type locality.

Description of Holotype

Scalation

Midbody scales in 34 rows. Dorsal scales with four weak keels; lateral scales with three very weak keels. Paravertebrals not counted. Ventrals smooth, 80 between postmental and preanal (exclusive). Preanals ten, median four slightly enlarged. Palmar tubercles slightly enlarged. Subdigital lamellae smooth, undivided, 24 under fourth toe. Supranasals and postnasals absent. Rostral and frontonasal in moderate contact. Prefrontals separated; frontal contacts frontonasal. Four supraoculars, second largest; first and second contact frontal. Frontoparietals fused. Interparietal distinct. Parietals large, in contact behind interparietal. Each parietal bordered posterolaterally by upper secondary temporal and enlarged nuchal. Supraciliaries seven. Upper ciliaries seven (fourth, fifth and sixth enlarged). Lower ciliaries ten. Lower eyelid moveable, with a transparent palpebral disc. Supralabials seven, fifth subocular. Infralabials seven. Ear opening obvious; no ear lobules.

Dimensions

SVL 51 mm. Length of tail (regrown) 64 mm. Length of forelimb 15 mm (29% of SVL). Length of hind limb 20 mm (39% of SVL). Length of eye 2.3 mm. Length of palpebral disc 1 mm (43% of eye length). Diameter of ear opening 0.9 mm.

Colour

Brown dorsally with a black vertebral stripe and flecked with lighter and darker patches. Narrow dorsolateral light stripe runs from nostril, above eye, then continuously along anterior one-third of body, becoming fragmented posteriorly. Upper lateral zone black, bordered by a light midlateral stripe starting at ear and ending at hind limb. Lower lateral zone mottled grey and black. Venter unmarked grey, with dark mottling under chin.

Distribution

Leiolopisma pretiosum occurs in forests, woodlands and rocky areas throughout most of Tasmania (fig. 2B). It is also found on many of the adjacent small islands, including Maria, Tasman, Ile du Golfe, the Maatsuyker Group, and islets off the west coast. It occurs in the west of Bass Strait on King and Albatross Islands. Its occurrence in the east of Bass Strait is doubtful. Based on a single specimen (NMV D911) donated by Kershaw, Rawlinson (1967) recorded *L. pretiosum* from Flinders Island (Furneaux Group). However, there is some doubt about the accuracy of the data with many of Kershaw's specimens (A.J. Coventry, pers. comm.), and although the reptile fauna of Flinders Island has been comparatively well surveyed, no further *L. pretiosum* specimens have been collected. The species ranges from sea level up to about 1000 m elevation.

Variation in Mainland Populations

Ninety-three specimens from the Tasmanian mainland have been examined to assess variation within the main population of this species.

Scalation

Midbody scales in 32–38 rows (mode 34, mean 34.0), dorsals smooth to weakly keeled. Paravertebrals 58–69 (mean 62.6); only slightly broader than adjacent dorsals. Subdigital lamellae on fourth toe 20–25 (mean 22.6, n=20). Postnasal and supranasal scales fused to nasal, but usually with crescentic postnarial groove marking the inner margin of the fused postnasal. Anterior loreal single. Prefrontals usually separated (freq. 0.85). Supraciliaries usually 7, occasionally 6 or 8. Supralabials 7, rarely 6 or 8; variation due to fusion of third and fourth supralabials or division of the third; fifth (of seven) supralabial subocular. Asymmetry of supralabial and supraciliary counts is common. Usually one presubocular. Temporals 1 + 2. Upper secondary temporal in contact dorsally with the parietal and posteriorly with the single enlarged nuchal. Postmental contacts first and second infralabials.

Dimensions

SVL of adult males 44–56 mm (n=20), adult females 45–57 mm (n=20). Hind limb 37.0–42.2 %SVL. Forelimb 27.4–33.3 %SVL. Original tail 119–144 %SVL (mean 137%, n=9). Head width sexually dimorphic in adults; range 13.4–15.3 (mean 14.4) %SVL in males, 12.1–13.6 (mean 13.1) %SVL in females.

Colour

In preservative, dorsal surface of head, body and tail pale grey-brown to medium metallic brown. Black vertebral stripe always detectable, but occasionally only weakly developed, running from nuchals to proximal part of tail. Scales of back usually lightly to heavily flecked with darker and lighter flecks; pale flecks sometimes absent, and more rarely dorsum immaculate apart from vertebral stripe. Upper lateral zone dark brown to black, sometimes speckled with white or pale grey, extends from scale row 4 to scale row 7 or 8. This zone narrowly edged above by whitish dorsolateral line (sometimes absent) and below by white midlateral stripe from neck to groin. This stripe has an irregular blackish lower margin. Top of head and legs flecked blackish. Underside off-white to light grey, often with dark-edged throat and chin scales.

Colour in life as above, but underside of most adults with vague to moderately intense orange or pink flush, usually running from posterior third of belly to proximal quarter of tail.

Cranial osteology (fig. 3D)

Similar in most respects to *L. microlepidotum* (see above).

Variation in Insular Populations

Table 2 summarises interpopulation variation in several characteristics of this species.

Throughout mainland Tasmania this species shows relatively little variation in size, colour or scalation. A slight south to north cline is apparent, with northern animals being marginally larger and averaging slightly higher midbody scale counts — counts of 36 are more common in the north, and one northern specimen is the only mainland *L. pretiosum* recorded with 38 midbody scale rows. However, much more variation is seen in specimens from offshore islands, as shown in table 2. A recurring trend is for island animals to be larger and have smaller midbody scales (higher row counts) than is usual for mainland specimens, and on some islands these values range higher than any mainland population. In addition, instances of head shield variations which are rare in mainland populations become common or even usual in certain island populations. Thus over half of the Albatross Island specimens have a transverse suture

TABLE 2

Interpopulation Variation in *Leiolopisma pretiosum*

Island	Midbody scale rows Range (mean)		Paravertebral scales Range (mean)		Adult SVL Range (mm)	n
Tasmania						
Overall	32–38	(34.0)	58–69	(62.6)	44–57	93
South						
(Hartz Mt, Mt Wellington)	32–36	(33.9)	58–67	(61.7)	44–57	45
North						
(Tamar vly, Maggs Mt)	32–38	(34.3)	59–68	(64.2)	45–56	27
King Island	32–38	(34.5)	59–71	(62.8)	44–61	30
Albatross Island[†]	32–38	(35.8)*	63–80	(68.8)*	49–60	36
Swainson Island[‡]	33–34	(33.6)	60–67	(62.2)	53	5
Breaksea Islands[§]	32–36	(34.7)	61–67	(63.5)	51–55	9
De Witt Island	33–36	(35.1)**	61–67	(63.6)	47–56	12
Flat Top Island	36–38	(37.2)*	66–70	(67.8)*	52–58	6
Maatsuyker Island	32–36	(33.6)	60–70	(63.7)	44–55	29
Mewstone[¶]	34–40	(37.4)*	62–73	(67.3)*	52–70	30
Louisa Island[#]	34–37	(35.5)**	59–65	(61.3)	49–53	9
Ile du Golfe	32–36	(34.0)	58–66	(61.9)	47–56	44
Tasman Island	34–37	(35.5)**	64–74	(67.5)*	45–57	12

Notes:
[†] 53% of specimens have "interprefrontal" shield.
[‡] Four specimens (80%) with prefrontals in contact.
[§] Five specimens (56%) with prefrontals in contact.
[¶] Some specimens in poor condition; midbody scale counts taken from 30 specimens, paravertebrals from 28.
[#] Two specimens (22%) with divided frontoparietals.
Asterisks indicate significant differences from mainland specimens (overall values) using Student's t-test:
* $p < 0.001$, ** $0.01 > p > 0.001$

across the anterior one-third of the frontal, forming an azygous "interprefrontal" shield. This peculiarity was seen in only one of 93 mainland specimens. Other island abnormalities included fusions or partial fusions involving the parietals, nuchals and prefrontals, divisions of the frontoparietals and partial separation of supranasal and postnasal scales.

The most distinctive island population is from the Mewstone, the southernmost and deepest water islet supporting *L. pretiosum*, and also one of the smallest. The islet is a rocky peak only 6.8 ha in area (White 1981), is almost unvegetated, and lies in 110 m of water (Rawlinson 1974a). Mewstone animals are by far the largest *L. pretiosum* (table 2) and have the smallest scales, the modal count being 38 and ranging as high as 40. Most also have the supranasals partially separated posteriorly. Although younger specimens, and some adults, have a colour pattern typical of mainland *L. pretiosum*, many larger individuals may be aberrant in colour pattern, with a heavy suffusion of black markings, and most live specimens have a greenish sheen. The venter is usually yellow-green with an orange wash on the posterior belly and proximal tail. The small sample from Flat Top Island, a small (2 ha) deep-water (91 m) islet 12.6 km to the northeast, resembles the Mewstone population in the modal midbody scale count of 38. It is interesting to note that in scalation, colouring and relatively large size, Mewstone animals approach *L. palfreymani*, a species confined to Pedra Branca Islet about 62 km ESE of the Mewstone. *L. palfreymani* has well developed supranasal and postnasal scales, 38 or 40 midbody scale rows, and reaches a still larger maximum size (92 mm SVL).

TABLE 3

Comparisons of Scalation and Adult Size in Sympatric and Adjacent Populations of *Leiolopisma microlepidotum* and *L. pretiosum*

Population	Midbody scale rows Range (mean)	Paravertebral scales Range (mean) (mm)	Adult SVL Range (mean)
A. Sympatry			
Mt Wellington "chalet"			
L. microlepidotum (n=5)	38–42 (40.6)	77–80 (77.8)	58–62 (59.6)
L. pretiosum (n=7)	32–36 (33.9)*	60–65 (62.6)*	48–53 (50.0)*
B. Parapatry			
Mt Wellington pinnacle			
L. microlepidotum (n=52)	36–44 (39.2)	70–81 (76.8)	51–66 (58.9)
Mt Wellington "geology sign"			
L. pretiosum (n=27)	32–36 (33.9)*	58–67 (61.7)*	44–57 (50.9)*
Mt Rufus summit			
L. microlepidotum (n=7)	34–36 (34.9)	66–73 (70.0)	50–58 (53.0)
Mt Rufus lower slopes			
L. pretiosum (n=7)	32–36 (34.3)	60–64 (62.1)*	47–52 (49.7)*
Hartz Mt National Park			
– L. Osborne/L. Perry/Ladies Tarn			
L. microlepidotum (n=9)	32–35 (33.4)	64–79 (70.1)	56–68 (61.1)
– Waratah lookout			
L. pretiosum (n=9)	33–36 (34.2)	59–64 (60.9)*	44–54 (47.6)*

* *L. pretiosum* significantly different (t-test, $p < 0.001$) from the corresponding data for *L. microlepidotum*.

SYMPATRY OF *L. MICROLEPIDOTUM* AND *L. PRETIOSUM*

On Mt Wellington, samples of five *L. microlepidotum* and seven *L. pretiosum* were collected during January 1980 at "The Chalet", a roadside rotunda, at an elevation of 1000 m, just below the treeline. This locality is 4 km from the pinnacle along the main Mt Wellington road. There is no evidence of intergradation in the characters which distinguish the species (size, midbody and paravertebral scalation, colour; table 3), nor is any overlap apparent with the two other species, *L. metallicum* and *L. ocellatum*, which occur at this locality.

Three other areas of close parapatry or possible sympatry are known, Mt Rufus, Mt Picton and the Hartz Mountain area. As shown in table 3, size and paravertebral scale counts separate both species at all localities, while at Mt Wellington midbody scale counts are also significantly different. At all localities, colour pattern is also an obvious guide to identification.

ECOLOGY AND REPRODUCTION

Both *L. microlepidotum* and *L. pretiosum* are agile, diurnally active, scansorial lizards adapted to living on fallen logs, trees or rock outcrops. *L. microlepidotum* appears to be restricted to the cold temperate zone (defined by Rawlinson 1974a), whereas *L. pretiosum* is also common in the cool temperate zone. Both species may occur in very high densities in suitable habitats, but nothing is known of their social organisation. *L. pretiosum* has been observed aggregating in communal refugia in log or rock crevices, and both species often bask in groups.

Leiolopisma microlepidotum occurs at high altitudes, where it appears to be restricted to more open habitats above the treeline. In these areas it is usually found in association with large rock outcrops, utilising exposed rock faces as basking sites and retreating into rock crevices or surrounding dense vegetation when disturbed. Presumably these sheltered sites are also used during periods of inactivity which, in alpine Tasmania, may be quite extensive. Foraging occurs on the open rock surfaces and in surrounding vegetation, and a variety of invertebrates is taken.

Leiolopisma pretiosum occurs in a range of habitats where there are trees or where rocks outcrop, usually at lower altitudes than *L. microlepidotum*. *L. pretiosum* uses the elevated surfaces of fallen logs, the trunks and lower limbs of trees, and, less frequently, rocks for basking sites. Where it coexists with the rock-dwelling *Leiolopisma ocellatum*, it may to some extent be displaced from rocky sites by that species. *L. pretiosum* forages widely from basking sites and also takes a wide variety of invertebrate prey.

On many of the small islands inhabited by *L. pretiosum*, and on low mountains of the far southwest mainland, trees are almost or totally absent (White 1981). In these habitats, *L. pretiosum* is a rock dweller (other saxicoline species appear to be absent), and crevices in rocks are used as retreats. Some of the smallest islets almost completely lack vegetation of any kind, but on at least one such islet, the Mewstone, a large population of *L. pretiosum* is apparently supported by the islet's colony of shy albatross (*Diomedea cauta*). Lizards have been observed feeding on fish remains in the colony, and even feeding inside the carcasses of dead albatross chicks (Rounsevell *et al.* 1985, N. Brothers, pers. comm. 1987). In this respect, *L. pretiosum* is similar to *L. palfreymani* (Pedra Branca islet, Tasmania) and *L. nigriplantare* (Chatham Islands, New Zealand), which also inhabit small sea-bird islands and live at least partly off the nesting colonies (McCann 1955, Rounsevell *et al.* 1985).

Both species are shuttling heliotherms, maintaining body temperatures (when active) within relatively narrow limits, often well above ambient, by alternating between basking and moving to shaded areas. Rawlinson (1974a) stated that for *L. pretiosum* the normal activity range is from a voluntary minimum of 21.5°C to a voluntary maximum of 37.2°C, with a mean of 29.1°C (n=8) when measured in the laboratory. Greer (1982) measured in the field the body temperatures of 30 individuals from the summit of Mt Wellington. He found that the active body temperature of this species ranged from 22.6°C to 31.8°C, with a mean of 27.3°C. Air temperature at that time ranged from 13.2°C to 19.9°C (mean 17.6°C), with the greatest difference between a lizard body temperature and adjacent air temperature being 18.6°C. The difference between the mean active body temperatures quoted for *Leiolopisma pretiosum* and *L. microlepidotum* may only reflect the differing experimental methods used in obtaining these data, but it is interesting to note that the species inhabiting the colder environment appears to be more "cold adapted", with a lower mean ("preferred") body temperature.

Weekes (1930) looked at reproduction and placentation in what she referred to as *L. pretiosum* collected from Mt Wellington. As both *L. pretiosum* and *L. microlepidotum* occur at this general locality, her material may have consisted of either or both species. It appears that reproductive details are very similar in these closely related species, so her findings on placental structure are probably applicable to both. Rawlinson (1974a) and Greer (1982) listed a number of reproductive details for *L. pretiosum*, and these may be variously attributed to *L. pretiosum* or *L. microlepidotum* as discussed below.

Both species are viviparous, sustaining the embryos within the oviducts via simple placentation and giving birth to live young. It appears probable that most of the nutrients necessary for development of the embryos are contained within the yolk deposited on the ova prior to ovulation, and that the allantoplacenta functions mainly for the exchange of water and respiratory gases (Weekes 1930). Adequate reserves, in the form of abdominal fat bodies, are thus needed for reproduction. They accumulate slowly from food consumed during periods of activity, and are used rapidly in the formation of yolk for the developing ova.

Like most other viviparous species of Australian *Leiolopisma*, *L. pretiosum* and *L. microlepidotum* have obligate sperm storage during the winter period of inactivity (Rawlinson 1974a). Maximum testis size, and presumably mating, occurs in late summer or autumn, directly after the birth of the young, and the sperm must be stored by the females until spring, when ovulation and fertilisation take place. The gestation period is variable, depending on local climate. For example, *L. pretiosum* from lowland northern Tasmania have been recorded giving birth in early January, while specimens from higher altitudes or more southerly latitudes, where time available for activity each year can be much less, may give birth as late as April. Similarly, *L. microlepidotum*, living in the cooler southern, high-altitude areas, would not usually give birth until autumn. In fact, Swain (1972) suggested that some females of some species of Tasmanian skinks may retain the embryos in the oviducts during the winter and give birth the following spring. Our observations lend some support to this contention: firstly, *L. microlepidotum* collected from Mt Wellington in January had embryos at a very early stage of development; secondly, apparently recently born individuals of *L. microlepidotum* were collected from Mt Hartz in early February, when some females were carrying early embryos; and thirdly, some *L. pretiosum* collected from the Mewstone in May were still carrying near-term embryos.

The litter size of the two species is similar (table 4), with a range of 1–4 for *L. microlepidotum* and 1–3 for *L. pretiosum*. The closely related *L. orocryptum*, *L. ocellatum* and *L. greeni* also have small litters (3–4, 1–4 and 2–3 respectively), a characteristic of the *L. spenceri* group (Greer 1982). There may be some difference between *L. pretiosum* and *L. microlepidotum* in the size of young at birth, neonates of the former measuring 22–24 mm SVL (mean 23.1, n=8), while the smallest juveniles of *L. microlepidotum* are 24–33 mm SVL. Neonate sizes are not available for *L. microlepidotum* as all pregnant females collected by the authors (on several occasions and from several localities) have aborted within a few days; size data are therefore from the smallest field-caught juveniles (n=6).

It is not known how long juveniles of either species take to reach reproductive size. No distinct yearly size classes are discernible in the available samples of pre-reproductive individuals, but these samples indicate that both species probably take at least two years to reach sexual maturity. The true time could be much longer and may be variable, depending on locality and possibly on climatic differences between years. Males of *L. pretiosum* from 44–56 mm SVL have been recorded with enlarged testes, and females with young measure 44–57 mm SVL (mainland Tasmanian populations). Size at maturity is greater in *L. microlepidotum*, males ranging 50–69 mm and females 51–68 mm.

The percentages of females which reproduce in any given season for the five Tasmanian endemic *Leiolopisma* for which data are available are shown in table 4. Greer (1982) has already noted that not all females in a sample of *L. greeni* collected by him were pregnant. Our data indicate that, while all females of the two species characteristically found at lower altitudes (*L. ocellatum* and *L. pretiosum*) breed each year, a proportion of females of the three montane species (*L. greeni*, *L. microlepidotum* and *L. orocryptum*) do not breed each year. The cool climate and short growing season in alpine habitats could reduce the yearly activity of these species such that females cannot gather enough resources for reproduction in one season, or there may be insufficient time for embryonic development to be completed in one season. Both of these factors may force females to reproduce only every second year.

Biennial reproduction has been recorded in other reptiles inhabiting similar environments (Fitch 1970) but is not known in other Australian lizards. The data in table 4 indicate that usually more than 50% of females in samples of the three alpine species are recorded as breeding. This could be due to sampling bias, in that gravid females are more "catchable" (Shine 1980) and hence disproportionately represented in samples; or that when conditions are more favourable, in some localities or in some years, females may reproduce more frequently.

RELATIONSHIPS

Greer (1982), following Rawlinson (1974b, 1975), partitioned the Australian species of *Leiolopisma* into two species groups. These represent adaptive complexes to an arboreal/scansorial (*spenceri* group) or a terrestrial/grass-dwelling (*baudini* group) niche. It is not clear whether the groups represent monophyletic units (Shea 1987).

Several subgroups of biologically and morphologically similar species can be identified within each of Greer's species groups. The largest such subgroup can be termed the Tasmanian species group, since all are restricted to Tasmania and its adjacent islands. This subgroup consists of

TABLE 4

Female Reproductive Data for Five Endemic Tasmanian Skinks*

Species, locality & date	Number of adult females	Number of females reprod. (%)	SVL of adult females Range mm (mean)	Litter size Range (mean)
L. greeni				
Pine Lake				
Dec 1975	16	8 (50)	54–72 (63.7)	2–3 (2.2)[G]
Jan 1987	10	6 (60)	58–67 (61.7)	2–3 (2.3)
Mt Barrow				
Jan 1980	11	9 (82)	54–59 (56.3)	2
Mt Rufus				
Jan 1987	13	7 (54)	59–70 (63.5)	2–3 (2.3)
L. microlepidotum				
Mt Wellington				
Dec 1975	9	9 (100)	51–63 (?)	2–4 (2.4)[G]
Jan 1980	39	25 (64)	52–66 (57.5)	1–4 (2.6)
Mt Eliza				
Jan 1987	15	9 (60)	55–65 (58.4)	2–3 (2.3)
Mt Hartz				
Jan 1987	7	5 (71)	58–68 (63.4)	2–4 (2.8)
L. ocellatum				
Hamilton				
Jan 1980	13	13(100)	58–68 (63.0)	1–4 (2.7)
Lake St Clair				
Jan 1987	8	8(100)	61–73 (67.4)	2–4 (3.1)
various				
Dec 1975	11	11(100)	58–71 (64.4)	2–4 (2.6)[G]
Jan 1980	11	11(100)	54–71 (64.1)	1–3 (2.0)
L. orocryptum				
Mt Eliza				
Jan 1987	9	6 (67)	52–62 (56.7)	3–4 (3.1)
L. pretiosum				
Wilmot				
Dec 1975	5	5(100)	44–50 (48.0)	2–3 (2.2)[G]
Mt Rufus				
Jan 1987	6	6(100)	47–52 (49.7)	1–3 (2.0)
Mt Wellington				
Jan 1980	16	16(100)	49–57 (52.1)	2–3 (2.5)
Ile du Golfe				
Jan 1987	19	19(100)	47–54 (50.5)	2–3 (2.4)

* Data include both pregnant females and those which have recently given birth.
G Data from Greer (1982).

L. greeni, *L. microlepidotum*, *L. ocellatum*, *L. orocryptum*, *L. palfreymani* and *L. pretiosum*. They share the following combination of derived character states: frontoparietal shield single; midbody scales small to very small (in 28–58 rows); viviparous, with consistently small litters (1–4; no litter size data for *L. palfreymani*); limbs relatively long (33–47% of SVL; Greer 1982, table 8). As noted by Hutchinson *et al.* (1988), these Tasmanian endemics are probably more closely related to *L. metallicum* than to *L. spenceri*.

Although *L. microlepidotum* and *L. pretiosum* have so long been regarded as conspecific, there is no evidence which would suggest any closer relationship between the two than membership of the Tasmanian subgroup. Several characters are derived within the subgroup, such as decrease in scale size, enlargement of pterygoid or ectopterygoid bones, degree of dorso-ventral flattening and loss of the primitive "brown dorsum-black sides" colour pattern, but each species shows a different mosaic of primitive and derived states. Morphological, ecological and nearly-complete biochemical data indicate that *L. microlepidotum* is most closely related to the two other alpine species, *L. orocryptum* and *L. greeni*, while *L. pretiosum* has no obvious sister species.

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APPENDIX

Specimens Examined

Leiolopisma microlepidotum: TASMANIA. Mt Hartz pinnacle (TMH C692, C698, C700–06, C709–712); Ladies Tarn, 2 km N of Mt Hartz (TMH C717, C720–23); Lake Osborne, Hartz Mt National Park (PR TF18–19, TF21); Lake Perry, Hartz Mt National Park (PR TF14); Picton area (NMV D10955); Mt Wellington pinnacle (AMS R9466, R81926–57, NMV D38007, PR TF64–109); Mt Wellington, 4100 ft (AMS R15889–90); 3 km (road) below Mt Wellington pinnacle (PR TF44–48); "Chalet", 4 km (road) below Mt Wellington pinnacle (PR TF1–5); "Hobart" (NMV D2086); Snowy Mountains (= Snowy Range) (TMH C107); Lake Fenton, Mt Field National Park (NMV D37996–97, D38008–12); Wombat Moor, Lake Dobson, Mt Field National Park (NMV D37978–79); Mt Anne (NMV D57599–600); Mt Eliza (TMH C624–656, C683, C687–88); Mt Sprent (TMH C780, C785–88, C791); Mt Rufus (NMV D37976, TMH C542, C576–80); no other data (BMNH 1946.8.16.17).

Leiolopisma pretiosum: TASMANIA. New Harbour, islet 100 m S of Smoke Signal Hill (QVML 1985-3-60); Cox Bight (TMH C108); Cataramaran (= Catamaran) (AMS R10052); Picton area (NMV D1125, D12724); Waratah Lookout, Hartz Mt National Park (PR TF25–29, TF132–35); 8 miles W of Geeveston (NMV D38005); Port Arthur (NMV D37980); Thumb Point, Tasman Peninsula (QVML 1985-3-71); West coast, between Macquarie Harbour and Port Davey (QVML 1972-3-200); Serpentine Creek (Lake Pedder) QVML 1967-3-15); Boyd River (TMH C781); Florentine Valley, Maydena (NMV D37975); Russell River, 5 km N of Judbury (AMS R71642); foot of Mt Wellington (NMV D38015); "Geology sign", 4 km (road) below Mt Wellington pinnacle (PR TF49–63, TF110, TF114, TF118, TF122–129, TF131); "Chalet", 4 km (road) below Mt Wellington pinnacle (PR TF6–11, TF130); Mt Wellington (AMS R5485–87); Collins Cap (SAMA R2872); Mt Rufus (TMH C581–87); Lyell Highway, $^1/_2$ mile E of Clarence River bridge (AMS R39010); 8.7 km (road) S of Buckland (AMS R78610–12); Tooms Lake (QVML 1975-3-17); 12 miles E of Campbell Town (NMV D37977); Poatina (NMV D50046); 5 miles S of Golden Valley (NMV D38017–21); 24 km S of Deloraine (AMS R86325; PR TF138); 17.4 km N of Breona via Lake Highway (AMS R78591–608); Great Lake (QVML 1972-3-124); Upper Mersey valley (QVML 1983-3-22); Maggs Mt (QVML 1978-3-216, 219, 221–22, 226, 238–243); Rowallan Dam (QVML 1986-3-10); 10 km NW of Lake McKenzie (QVML 1986-3-13); 7$^1/_2$ miles S of Waratah turnoff (NMV D37981–82); Cradle Mt airstrip (QVML 1980-1-27); 26.8 km (road) S of Wilmot P.O. (AMS R78613–23); Wilmot (TMH C690); Mole Creek (QVML 1967-3-23); Needles, via Deloraine (QVML 1977-3-18); Cataract Gorge, Launceston (PR TF30–37, TF137); Cascade Gorge (= Cataract Gorge) (AMS R111396, R111401–02); First Basin, Cataract Gorge (QVML 1972-3-61); "near Launceston" (QVML 1978-3-115); 2$^1/_2$ miles (road) below Mt Barrow summit (NMV D38023–05); 1 mile N of Mt Barrow (NMV D38003, D38013–14); Thornton Ridge, west coast (QVML 1981-3-119-120); West Point (AMS R64711); Julius Depot, northwestern Tasmania

(QVML 1978-3-107, 1986-3-22); 16 miles E of Marrawah (NMV D38002); West Frankford (QVML 1978-3-184); Tatana (= Exeter) (QVML 1972-3-62); Exeter (QVML 1972-3-170, 1975-3-9); Legana (PR TF38–43); Mt Arthur, "south side, $^2/_3$ way up" (QVML 1963-3-11); Mt Arthur (QVML 1984-3-14); 5 km S of Lilydale (AMS R102902–03); Myrtle Bank (QVML 1973-3-5); Mt Barrow road turnoff (NMV D38022); Ringarooma (QVML 1963-3-2); Kelso, Green's Beach (NMV D39943); Green's Beach (QVML 1972-3-141); 6 miles NNW of Smithton (NMV D38004); no other data (BMNH 1946.8.16.54).
KING ISLAND. Wickham (QVML 1973-3-13); Wickham Beach (QVML 1972-3-175); 1 mile E of Cape Wickham (NMV D37961–74); Loorana (QVML 1970-3-2, 1971-3-3); Porky Beach (QVML 1969-3-5; 1972-3-195); Cataraqui Point (QVML 1972-3-8).
ALBATROSS ISLAND. (NMV D37940–55; QVML 1973-3-3).
GREEN ISLAND. (QVML 1985-3-65).
TRUMPETER ISLAND. Main Island (QVML 1985-3-63).
EAST PYRAMIDS. (QVML 1985-3-52); West most (QVML 1985-3-55); East most (QVML 1985-3-51); Little Pyramid (QVML 1985-3-51).
MAVOURNEEN ROCKS. (QVML 1985-3-59).
BREAKSEA ISLAND. Main Island (QVML 1985-3-56); South Island (QVML 1985-3-58).
BIG CAROLINE ROCK. (QVML 1985-3-64).
SWAINSON ISLAND. (QVML 1985-3-55).
SUGARLOAF ROCK. (QVML 1985-3-54).
KETCHUM ISLAND. Unnamed islet 0.4 km E of Ketchum Island (QVML 1985-3-57).
LOUISA ISLAND. (AMS R80737–38; NMV D48809–15; QVML 1979-3-13).
MAATSUYKER GROUP. De Witt Island (NMV D48802–08, D48902–06, TMH C789–90); Flat Top Island (QVML 1985-3-72); Maatsuyker Island (NMV D37850–54, D37856–57, D37869, D37876, D37884, D37889–96, D37900).
MEWSTONE. (QVML 1985-3-46, 47, 62).
ILE DU GOLFE. (TMH C731–45, C747–70, C772–77).
TASMAN ISLAND. (QVML 1985-3-43).
MARIA ISLAND. Pinnacle, Mt Maria (QVML 1972-3-105); Counsel Creek, 100 m elev. (TMH C311).