

B R E V I O R A

Museum of Comparative Zoology

CAMBRIDGE, MASS.

29 JUNE 1967

NUMBER 267

A NEW GENERIC ARRANGEMENT FOR SOME AUSTRALIAN SCINCID LIZARDS

By Allen E. Greer

In Boulenger's (1887, vol. 3) classification of skinks, the genus *Lygosoma* was by far the largest and most heterogeneous group that defied further splitting on the basis of the characters used. Unable to recognize "natural" distinctions which would warrant full generic rank, Boulenger designated 11 "natural" species groups of *Lygosoma* as subgenera and thereby established a ranking system that then, as now, was little used in lizard taxonomy.

The relationships of one of Boulenger's *Lygosoma* subgenera, the subgenus *Rhodona*, and part of the genus *Ablepharus* are re-examined in the present paper.

Boulenger's (1887:223) subgenus *Rhodona* was based on an unusually large suite of external characters, being defined as follows: "Limbs short or rudimentary. Lower eyelid with a transparent disk. Ear distinct, minute. No supranasals. Praefrontals very small and widely separated, or absent. Frontal broader than the supraocular region."

To this list could have been added the following: nasals enlarged so that they just fail to touch or do touch medially, 2-5 pairs of nuchals, and a single pair of enlarged preanals. In addition, it might have been noted that the group is found only in Australia and Tasmania.

The widespread Old World genus *Ablepharus*, on the other hand, was based essentially on a single character, Boulenger (1887:344) including in this genus all those skinks lacking "movable eyelids" and with a "transparent disk covering the eye." Obviously, Boulenger in this instance put great confidence in a single character, the "ablepharine" eye.

This single character approach should not be thought of as being too incongruous with Boulenger's general philosophy. In most other reptile groups with the "ablepharine" eye (non-eublepharine geckos, pygopodids, xantusids, and snakes), the character was

then and may still be rightly regarded as the hallmark of natural taxa. The "ablepharine" skinks, however, are an exception.

Boulenger's basic conception of *Rhodona* and *Ablepharus* was accepted by the authors of the two subsequent revisions of the "lygosomine" skinks (Smith, 1937; Mittleman, 1952). Malcolm Smith (1937) gave *Rhodona* full generic rank and included within it three southeast Asian (*anguinoides*, *roulei*, and *gyldenstolpei*) and one Australian (*australis*) species that in 1935 he had considered the sole representatives of the genus *Ophioscincus*.¹ This arrangement, however, was suspect on two counts. First, the species of *Ophioscincus* differ from those of *Rhodona* in lacking both fore and hind limbs and external ear openings, and in having no or only one pair of nuchals, and second, such an arrangement involves an improbable geographic distribution.

All skinks with an immovable transparent disc covering the eye were retained in *Ablepharus* by Smith (1937). In this he followed Boulenger, although he noted in 1935 that the group was almost certainly polyphyletic, probably having arisen from *Leiolopisma* and *Emoia* stocks.

Mittleman (1952), taking his cue from Smith's reasonable supposition of the polyphyletic nature of *Ablepharus*, cut the Gordian knot by separating out all *Ablepharus* that had the frontoparietals and interparietal fused into a single scale and placing them in the genus *Cryptoblepharus*. It is interesting to note that the "ablepharine" eye was still sacrosanct; no "ablepharine" skink was lumped with a non-"ablepharine" skink.

Similarly, Mittleman split Boulenger's *Rhodona* into two genera: *Rhodona* with the frontoparietals and interparietal fused into a single scale (indicated as 1 in Table 2), and *Nodorha* in which the frontoparietals are distinct (2/1) or fused (1/1) but always distinct from the interparietal.

Mittleman removed the four species of *Ophioscincus* from the *Rhodona-Nodorha* complex and was certainly right in doing so. However, in reverting to Smith's 1935 treatment of the genus *Ophioscincus*, he has re-emphasized the anomalous geographic distribution of that genus. The disjunct Australian, southeast Asian distribution, once again, makes the "naturalness" of the genus suspect.

Although Mittleman's arrangement provides groupings which are of value in identifying and cataloging skinks, it fails to demonstrate

¹ In 1887 the only known species of *Ophioscincus* Peters, 1873 was *australis*, and this was put in the subgenus *Lygosoma* by Boulenger.

any greater awareness for the evolution of higher taxa than did earlier pre-Boulengerian classifications. This has been an *a priori* criticism of Mittleman's lygosomine classification since its publication, and perhaps explains why his system has been passed over in favor of a Boulenger-Smith arrangement by most present day authors. Even these two earlier authors must have been aware of many of Mittleman's "generic characters" but chose not to use them.

In my own research on the higher taxa of the skinks I have attempted to correlate characters of external morphology and skull morphology. It is my contention that when a suite of external and skull characters can be found in only a certain group of species, there is strong evidence that the group is "natural," i.e., monophyletic. The geographic distribution of the taxon is used as a further check of the validity of the arrangement. If the distribution of the taxon is consonant with the general geographic barriers influencing the distributions of other taxa, then the argument for the validity of the new taxon is strengthened.

A consideration of the external morphology has, of course, been the standard approach in skink taxonomy, although, like Boulenger (1887:131), I believe I have found new characters which are important.

Little has been done with skull morphology in relation to skink classification. Boulenger examined the relationships of the bones of the palate as seen through the epidermis of the mouth and utilized what he saw at the generic level. This method led to some serious misinterpretations of the anatomical facts and these have been perpetuated (see Smith, 1935, and Mittleman, 1952, for example) until the present time. By removing the epidermis overlying the palate, Waite (1929) and Mitchell (1950) made a technical advance, but failed to take full advantage of it in their own taxonomic work.

My own approach (outlined above) has provided evidence which convinces me of the previously only suspected polyphyletic nature of many groupings in all three earlier classifications (Boulenger, 1887; Smith, 1937; and Mittleman, 1952). Many of the single characters which were utilized exclusively or heavily in diagnosing skink taxa simply do not correlate with any other characters (internal or external), as one would expect them to do in a natural group.

Other correlations utilizing skull and external characters are possible, however, and will form the basis of a new classification of skinks. This brief study delimiting a newly recognized taxon and giving it generic rank is an example of the new approach and

is a first contribution toward the distant goal of a complete generic revision of the skinks.

The taxon to be discussed here consists of all the species of *Rhodona* (*sensu* Boulenger) and those species of Australian *Ablepharus* that conform to the descriptions of *Rhodona* except for the "ablepharine" eye (Table 2). The earliest named species of the group (*Ablepharus lineata*) was described by Bell in 1833 (see below) as the type species of *Lerista*. The new taxon should therefore be properly known as *Lerista*, with the following primary generic synonymy.

LERISTA Bell

- Lerista* Bell, 1883, Proc. Zool. Soc. London, p. 99 (Type species, *Lerista lineata* Bell, 1833, by monotypy)
- Rhodona* Gray, 1839, Ann. Mag. Nat. Hist., vol. 2, p. 335 (Type species, *Rhodona punctata* Gray, 1839, by monotypy).
- Soridia* Gray, 1839, Ann. Mag. Nat. Hist., vol. 2, p. 335 (Type species, *Soridia lineata* Gray, 1839, by monotypy).
- Brachystopus* Duméril and Bibron, 1839, Erpétologie générale, vol. 5, p. 778 (Type species, *Brachystopus lineopunctulatus* Duméril and Bibron, 1839 = *Rhodona punctata* Gray, 1839, by monotypy).
- Praepeditus* Duméril and Bibron, 1839, Erpétologie générale, vol. 5, p. 787 (Type species, *Soridia lineata* Gray, 1839, by monotypy).
- Ronia* Gray, 1841, Ann. Mag. Nat. Hist., vol. 7, p. 87 (Type species, *Ronia catenulata* Gray, 1841 = *Rhodona punctata* Gray, 1839, by monotypy).
- Leptosoma* Fitzinger, 1843, System reptilium, p. 23 (Type species, *Riopa bougainvillii* Duméril and Bibron, 1839, by monotypy).
- Ophiopsis* Fitzinger, 1843, Systema reptilium, p. 23 (Type species, *Lerista lineata* Bell, 1833, by monotypy).
- Miculia* Gray, 1845, Catalogue of the specimens of lizards in the collection of the British Museum, p. 66 (Type species, *Miculia elegans* Gray, 1845, by monotypy).
- Pholeophilus* A. Smith, 1849, Illustrations of the zoology of South Africa, p. 15 of Appendix (Type species, *Pholeophilus capensis* Smith, 1849 = *Soridia lineata* Gray, 1839, by monotypy).
- Phaneropus* Fischer, 1881, Arch. Naturg. Jhrg. 47, p. 236 (Type species, *Phaneropus muelleri* Fischer, 1881, by monotypy).
- Nodorha* Mittleman, 1952, Smithsonian Misc. Coll., vol. 17, p. 14 (Type species, *Riopa bougainvillii* Duméril and Bibron, 1839, by original designation).

DIAGNOSIS OF THE GENUS *LERISTA*

There is no single diagnostic character that will distinguish the species of *Lerista* from all other skink taxa. This is, however, not

to say that once one is familiar with the diversity of skinks that a species of *Lerista* cannot be identified as such at a glance.

On the basis of external characters, the taxon may be diagnosed as follows: no supranasals; nasals enlarged so that they just fail to touch or do touch medially; prefrontals reduced and widely separated or absent; frontal generally broader than supraocular region; frontoparietal/interparietal configuration = 2/1, 1/1, or 1; 2-5 pairs of nuchals; lower eyelid with a transparent disc and either movable or fused to form a permanent spectacle; no row of scales separating the small scales of the eyelid from the subocular supralabial; ear opening small to minute, but always present; a single pair of enlarged preanals; body form attenuate; limbs diminutive or rudimentary, but never totally lacking (digital formula from 5-5 to 0-1).

DESCRIPTION AND RELATIONSHIPS OF THE GENUS *LERISTA*

The following description of the taxon *Lerista* is based on an examination of whole skulls, alcoholic specimens (see Materials section of paper), and also of type descriptions when species have not been available.

The skull is considered first, as skull morphology has generally proved more useful in determining the broader relationships of skinks than has external morphology.

Skull morphology: The skull characters of the species are remarkably uniform, although the species adapted to a more burrowing way of life (e.g., *L. bipes* and *L. praepedita*) show certain modifications in the skull that are often seen in burrowing skinks.

To facilitate comparisons with its near relatives, a brief description of the skull characters of the genus is given.

The whole skull tends to be somewhat conical in shape. The palatines are approximately 2-2½ times as long as broad and meet along their entire medial edge. The palatal rami of the pterygoids are "squared-off" and in some species slightly emarginate posteriorly, and they also meet along their medial edge (Fig. 1). The palatines and palatal rami of the pterygoids thus form an extensive "secondary palate." Among lizards the tendency toward the formation of a bony secondary palate is unique to skinks, and the extensive palatine-pterygoid palate of *Lerista* is, in turn, a rather "advanced" development of the palate in skinks.

An ectopterygoid process extends forward along the lateral edge of the palatal ramus of the pterygoid, past the palatine-pterygoid suture and onto the posterolateral edge of the palatine, thereby

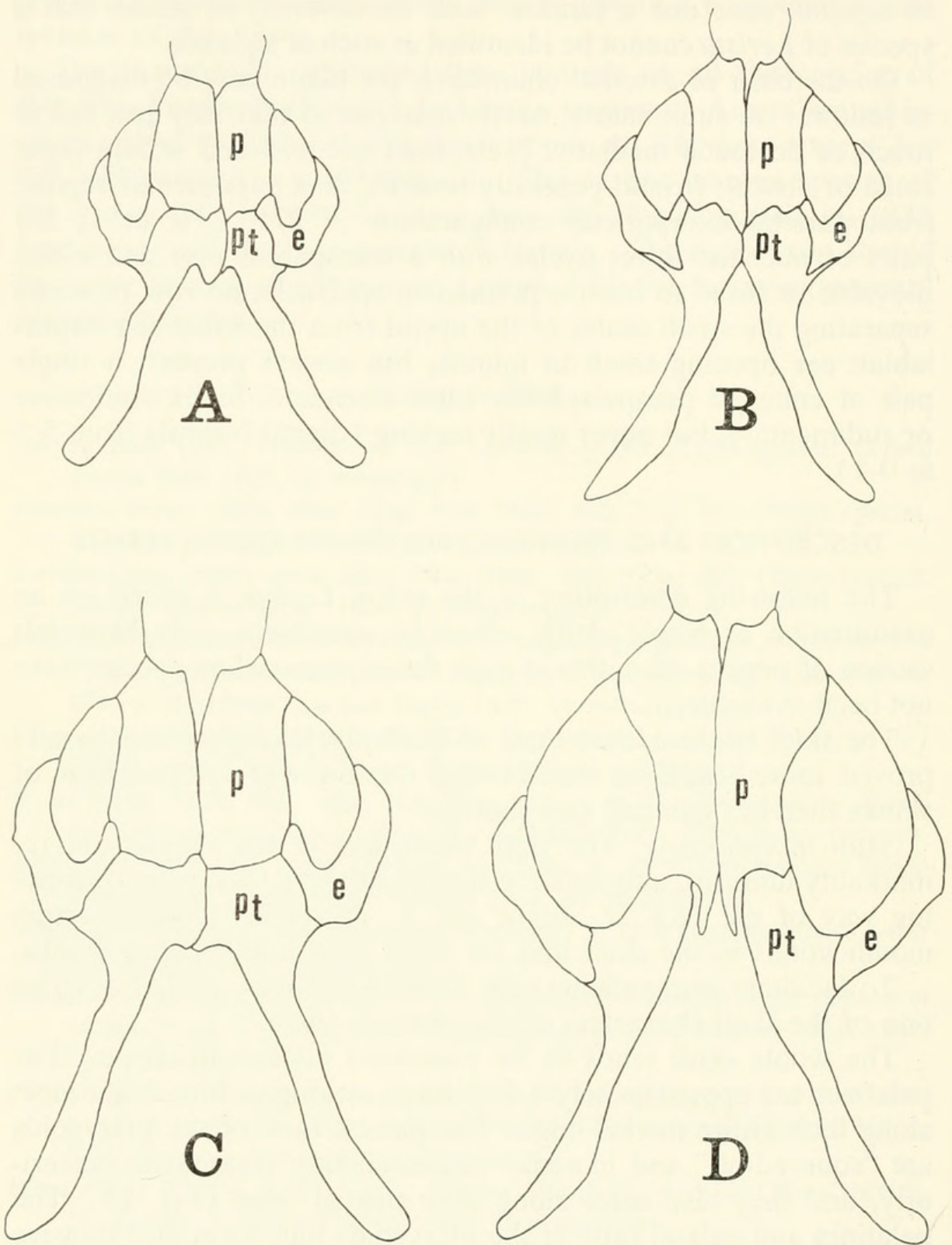


Figure 1. Ventral view of the palate of *A*, *Lerista elegans* (FMNH 11319), Lake Toolburnup (= Tool Brumup), Western Australia; *B*, *Sphenomorphus pardalis* (MCZ 35413), Coen, Cape York, Queensland; *C*, *Lerista bougainvilli* (MCZ 61403), Tallarock, Victoria; *D*, "*Ablepharus*" *lineocellatus* (MCZ 33144), Margaret River, Western Australia. Abbreviations for this figure: *e*, ectopterygoid; *p*, palatine; *pt*, pterygoid, *A*, *C*, and *D* drawn to scale.

excluding the pterygoid from a position on the infraorbital fenestra (Fig. 1). This anteriorly projecting ectopterygoid process is also unique to skinks, among lizards, although it is not found in all skinks.

The premaxillae and nasals are paired; the vomer, frontal, and parietal are single. There is a parietal foramen in the parietal. The frontal and maxilla form a surface suture or the frontal, prefrontal, maxilla, and nasal meet at a point.

The temporal arch and the postorbital bar (formed by the jugal) are present. A small supratemporal fenestra may be present but is more frequently covered by the posterior extension of the postfrontal. A postorbital is lacking.

The bones of the skull and mandible generally lack pigment.

Teeth are present on the maxillae, premaxillae, and dentaries. There are usually 7 (5 in *L. bipes* and 6 in *L. lineopunctulata*) teeth on the premaxillae and 9-13 (usually 11-12) on each maxilla.

Meckel's groove may be present or partially overlapped by the dentary.

Relationships as inferred from skull morphology. On the basis of the relationships of the bones of the palate, *Lerista* is most similar to *Hemiergus* and one group of *Sphenomorphus* species (Fig. 1). For convenience, this latter group may be referred to as the *solomonis* group; it encompasses so far as is known the following species: *solomonis*, *emigrans*, *pardalis*, *australe*, *antimorum*, *crassicauda*, *tenuis*, and *tryoni*. The species of all three groups, that is *Lerista*, *Hemiergus*, and the *solomonis* group, have the palatines and the pterygoids meeting along the midline, and, except for three species of *Hemiergus* and *S. australe*, the species of all three groups possess an ectopterygoid process which extends forward to the palatine to exclude the pterygoid from the infraorbital vacuity.

In *Hemiergus peroni*, *H. tridactylus*, and *H. initiale* the anteriorly projecting ectopterygoid process has been secondarily reduced to a small nubbin which fails to exclude the palatal ramus of the pterygoid from a position on the infraorbital vacuity. The process is better developed in *S. australe* where it extends anteriorly about half way along that outer edge of the palatal ramus that would, in the absence of the process, border the infraorbital fenestra.

The species of the genus *Hemiergus* and the *solomonis* group, however, differ from the *Lerista* skinks in possessing more teeth on the premaxillae (8-9) and in having a long thin postorbital.¹

¹ The number of teeth on the premaxillae and the absence or presence and shape of the postorbital are of greater taxonomic significance in skinks than in most other lizard families.

The relationship of the bones of the palate described above for *Lerista* and its near relatives is not found in any *Ablepharus* other than in the "ablepharine" *Lerista*. In all other *Ablepharus* the palatal rami of the pterygoids are separated (contrary to Boulenger's 1887 diagnosis of the genus), and there is no ectopterygoid process (Fig. 1).

Furthermore, in all *Ablepharus* other than the "ablepharine" *Lerista* there are usually 9 (or more) teeth on the premaxillae, and the prefrontal often forms a broad suture with the nasal.

External morphology: In gross aspect the species of *Lerista* are attenuate skinks in which the tail comprises fully half the total length. The appendages are diminutive and widely separated when adpressed to the body. The head tends to be somewhat conical to wedge shaped.

Upon closer inspection it can be seen that the nasals are enlarged in a dorsoventral aspect so that they meet mid-dorsally behind the rostral or just fail to do so.

There are no supranasals and the frontonasal is wider than long. The prefrontals are small and widely separated or, in some species, they are absent. The frontal tends to be wider than the supraocular region and is in contact with 1 or 2 (usually 2) of the 2 to 4 (usually 3) supraoculars.

The frontoparietals and interparietal display the three possible degrees of fusion. The degree of fusion is indicated in Table 2 by a simple notation in which the number of frontoparietals is given on the left side of the slash mark (/) and the interparietal is indicated on the right side. The numeral one means that all three scales are fused into a single scale.

It can be seen from the data in Table 2 that there is a very approximate correlation between the state of fusion of the frontoparietals and interparietal and the reduction of the appendages and digits. Reduction of the appendages and digits is in turn correlated with burrowing habits. It would appear, therefore, that in species of more burrowing habits there is a greater tendency for the frontoparietals and interparietal to fuse. This is just one of several evolutionary trends (see below) in the group and, to me, it seems pointless to break the concept of this trend by splitting the spectrum into two parts as Mittleman (1952) did when he set up *Nodorha* as distinct from *Rhodona*.

The parietals meet behind the interparietal, and there are 2-4 pairs of nuchals.

There is a well defined transparent area or "window" in the lower

eyelid. In most species the lower eyelid is movable, but in a few it has become fused to the upper resulting in an "ablepharine" eye (Table 2). In all species of *Lerista* a supralabial contacts the small scales of the lower eyelid below the transparent area and thereby acts as a subocular. There are 2-4 (usually 3) supralabials anterior to the subocular (= a supralabial).

The external ear opening is small, that is, it is smaller than the transparent area in the lower eyelid, but although the opening is minute in several species, it is never completely covered over by the epidermis.

The scales around the midbody are smooth and number 16-24. There is a pair of very large preanals. The three midventral series of subcaudals are subequal.

The digital formula (fingers-toes) ranges from 5-5 to 0-1 (Table 2). Only two species have 5-5 while all others show a reduced number of digits, although no species is limbless. The digits are covered above by a single row of scales (Group I of Brongersma, 1942).

Color patterns in the genus are variations on a striped motif (Table 2). A solid, dark, dorsolateral stripe is common and often occurs in conjunction with either a third mid-dorsal dark stripe or with a pair of mid-dorsal broken dashed stripes on the two dorsalmost scale rows. A few species, on the other hand, lack broad dorsolateral or mid-dorsal stripes and simply have broken dashed stripes on each dorsal scale row. There seems to be little intra-specific variation in regard to pattern type.

In addition to the osteological differences mentioned above, two features of the external morphology serve to further separate the "ablepharine" *Lerista* from other *Ablepharus* and unite them with *Rhodona* in a common genus. These are (1) the enlarged nasals and (2) the reduced number of digits. Of all other *Ablepharus* only *A. greyi* and *A. burnetti* have a reduced number of digits (4-5). These two Australian species are, however, only distantly related to *Lerista* and will be discussed at a later date.

It might also be mentioned here that the species of *Lerista* differ from those attenuate, burrowing skinks of the subgenus *Lygosoma* which occur in Australia in having transparent eyelids and external ear openings rather than having scaly eyelids and completely covered ear openings.

The differences in skull morphology between *Lerista*, *Hemiergis* and the *solomonis* species group have been mentioned above.

Table 1 summarizes the external differences between the three groups.

Geographic distribution of Lerista and its relatives: It is significant that the genus *Lerista* is found only in Australia and Tasmania. If we discount, for reasons given above, any close affinity with *Ablepharus* and *Ophioscincus*, then it is clear that there are no close relatives of *Lerista* in either Africa or Eurasia.

The closest relatives of *Lerista*, namely *Hemiergis* and the *solomonis* assemblage, are quite obviously a product of the Australian Region. The species of *Lerista* represent an exclusively Australian adaptive radiation into the "surface litter and subsurface burrowing niche." They are certainly not the only lizards to have entered this niche — *Hemiergis* and some of the *solomonis* group species mentioned above also occupy it — but *Lerista* is one of the most successful groups to exploit it, if diversity and abundance are criteria for such success. Furthermore, it is the most specialized species of this genus that have exploited the relatively new (geologically speaking) arid areas of Australia.

EVOLUTIONARY TRENDS WITHIN THE GENUS *LERISTA*

The species of the genus as it is understood here can be arranged according to certain structural sequences that are undoubtedly indicative of the evolutionary trends that have occurred within the group.

One of these trends has been a reduction in the size of the limbs and the number of digits on the fore and hind feet (Table 2). In this regard it should be noted that the number of digits on the forefront are equal to or less than, but never greater than, the number of digits on the hindfoot. This pattern of digit reduction is common among lizards, the most noteworthy exceptions being the amphisbaenid *Bipes biporus* (digital formula = 5-0) and the scincid genus *Ophiomorus*. In the latter genus the number of fingers is equal to or greater than, but never less than the number of toes (Anderson and Leviton, 1966).

The reduction of the digits in *Lerista* is not unexpectedly correlated with other structural changes indicative of greater adaptation to burrowing habits (Mitchell, 1958); e.g., the size of the eye is reduced somewhat, the lower jaw becomes more countersunk into the upper, and the ear openings become more minute but never disappear.

Although there is a tendency toward smaller external ear openings in the species of *Lerista* more closely adapted to a burrowing

existence (e.g., *L. bipes* and *L. praepedita*), the quadrate bone undergoes no striking changes in shape from that found in most lizards with external ear openings. The bone is excavated posteriorly, and the tympanum attaches to the lateral rim. By way of comparison, the five species of *Hemiergis* are less closely adapted to a fossorial life than many of the *Lerista* skinks but have developed a simple rod-shaped quadrate concomitant with the loss of the external ear opening.

Several characteristic changes in the skull are found in the extreme burrowers of the group (*L. bipes* and *L. praepedita*). The skull posterior to the orbits is proportionately elongated, and the supra- and post-temporal fenestrae are often completely closed over, although no elements in the arches are lost. The prefrontal also tends to be reduced in its anterior extension, and posteriorly may touch the postfrontal to exclude the frontal from the orbit. In *L. bipes* and *L. praepedita* the premaxillae project forward well beyond the level of the premaxillary teeth, a modification which is undoubtedly an advantage to these species which employ the snout as a burrowing wedge.

The very approximate correlation between the loss of digits and the fusion of the frontoparietals and the interparietal (Table 2) has already been mentioned.

Most of the species of *Lerista* that have followed these trends to the extreme are among Australia's most closely adapted arid area dwellers. In this regard they are to arid Australia what *Ophiomorus* and *Scincus* are to arid southwest Asia and North Africa. The similarities are, of course, entirely convergent, for *Ophiomorus* and *Scincus*, which are rather closely related, are fairly distantly related to *Lerista*.

MODE OF REPRODUCTION IN LERISTA

Nothing has been published concerning the breeding habits of these skinks, although from the meager data presented below, it is evident that there are both live-bearing and egg-laying species in the genus.

A single *Lerista microtis* (MCZ 24577) with a snout-vent length of 51 mm contains three young in which scales and color pattern are evident, indicating that the young would probably be born.

L. timida, on the other hand, is apparently oviparous. A gravid female (snout-vent length = 40 mm) in the Field Museum of Natural History (97739) contains two oblong, whitish, leathery shelled eggs. An untagged female (snout-vent length = 46 mm) in the MCZ collection is likewise gravid with two shelled eggs.

Single females of *L. bougainvilli* (MCZ 6751; snout-vent length = 60 mm) and *L. punctatovittata* (FMNH 97747; snout-vent length = 85 mm) each contain three spherical, yolky oviducal eggs. These eggs were not far enough along in their development to allow speculation as to the mode of reproduction in either species.

THE SPECIES OF *LERISTA*

Although a thorough revision of the species in the genus is sorely needed, the following table (Table 2) may be of some use to those faced with the tedious curatorial duties of identifying and organizing collections. The table makes no pretense of being a summary of a generic revision and is based solely on the species as they are currently recognized in the literature. Two characters important in species diagnoses, namely the fusion or independence of the frontoparietals and the number of digits, are in the greatest need of re-evaluation on the intraspecific level.

The number of digits is, in fact, already known to vary somewhat within a single species. Boulenger (1887:335) recorded *R. gerrardi* as having either mono- or didactyl forelimbs, and Kinghorn (1924:180) reported on a specimen of *R. punctatovittata* with the "forelimb distinctly didactyl" rather than monodactyl. Loveridge (1934:372) also found a "rudimentary stump of a second toe" in *R. miopa*, a species which had previously been considered as having only a single toe on the hind foot.

Mitchell (1955:402) studied the variation in the tarsal (carpal) and metatarsal (metacarpal) bones in nine species of *Rhodona* and came to the conclusion that "among specimens of the same species . . . from different localities . . . the loss of digits and digital bones may not be always indicative of specific variation. The genus may be found to contain polytypic species within which the number of digits varies."

ACKNOWLEDGMENTS

Broad revisionary studies within the Scincidae would be impossible without the interest and cooperation of the curators of many institutions. The present study has been most generously supported through loans and encouragement from the following people and their respective institutions.

Miss A. G. C. Grandison, British Museum (Natural History) (BM); Drs. R. G. Zweifel and C. M. Bogert, American Museum of Natural History (AMNH); Dr. R. F. Inger and Mr. H. Marx, Field Museum of Natural History (FMNH); Drs. A. E. Leviton

and Steve C. Anderson, California Academy of Sciences (CAS); Dr. C. M. Walker, University of Michigan Museum of Zoology; Dr. G. S. Myers, Division of Systematic Biology, Stanford University.

A special word of thanks goes to Dr. Ernest E. Williams of the Museum of Comparative Zoology for his enduring interest in this continuing research on the relationships of skink taxa. His generosity with the reptile collection under his charge and his indefatigable assistance in obtaining specimens from which skulls could be prepared have, in fact, made this research possible.

Both Dr. Williams and my wife Carol have read and criticized the manuscript in many helpful ways.

MATERIALS

Complete skulls of the following specimens of *Lerista* have been examined: *bipes* (AMNH 86089); *bougainvilli* (MCZ 61403); *elegans* (FMNH 11319); *fragilis* (CAS 77190; MCZ 42988); *gerrardi* (MCZ 33255); *lineopunctulata* (BM 1902.7.30.5); *miopa* (MCZ 33260); *muelleri* (MCZ 86699); *planiventrale* (BM 1954.1-2.21); *praepedita* (MCZ 33265); *punctatovittata* (MCZ 79494); *tetradactyla* (BM 1902.7.30.6); *timida* (MCZ x-13246).

In addition, the relationship of the palatine, palatal ramus of the pterygoid, and the ectopterygoid were examined in the following specimens of *Lerista*: *bipes* (MCZ 33251, 35349, 35350, 79570); *bougainvilli* (MCZ 67149); *elegans* (MCZ 33126, 33136); *tetradactyla* (MCZ 51893); *timida* (MCZ 33152, 33153).

Nineteen of the 28 species of *Lerista* were available for examination as alcoholic specimens: *allanae* (2); *bipes* (20); *bougainvilli* (20); *distinguenda* (1); *elegans* (17); *fragilis* (many); *gerrardi* (12); *lineata* (2); *lineopunctulata* (1); *microtis* (2); *miopa* (3); *muelleri* (18); *nichollsi* (1); *planiventrale* (2); *praepedita* (6); *punctatovittata* (24); *stylis* (1); *tetradactyla* (6); *timida* (20).

For comparative purposes the following skulls of *Lerista*'s near relatives were examined: *Hemiergus decresiensis* (MCZ 49173); *H. initiale* (MCZ 33210); *H. peroni* (MCZ 24648, 24652); *H. quadrilineatum* (MCZ 33210); *H. tridactylum* (MCZ 24595).

Sphenomorphus antimorum (MCZ 25374); *S. australe* (MCZ 24568); *S. crassicauda* (AMNH 82606); *S. emigrans* (MCZ 27043); *S. pardalis* (MCZ 35413); *S. tenuis* (MCZ 35398); *S. tryoni* (MCZ 35387; 35388); *S. solomonis* (MCZ 72618, 72626, 72664, 72665, 77373, 77374).

LITERATURE CITED

ANDERSON, S. C. and A. E. LEVITON

1966. A review of the genus *Ophiomorus* (Sauria: Scincidae), with descriptions of three new forms. *Proc. Calif. Acad. Sci.*, **33**(16): 499-534.

BOULENGER, G. A.

1887. Catalogue of the lizards in the British Museum (Natural History). 2nd. ed., vol. 3, xii + 575 pp., British Museum, London.

BRONGERSMA, L. D.

1942. On the arrangement of the scales on the dorsal surface of the digits in *Lygosoma* and allied genera. *Zoologische Mededeelingen*, **24**(1-2): 153-158.

KINGHORN, J. R.

1924. Reptiles and batrachians from south and southwest Australia. *Rec. Australian Mus.*, **14**(3): 163-183.

LOVERIDGE, A.

1934. Australian reptiles in the Museum of Comparative Zoölogy, Cambridge, Massachusetts. *Bull. Mus. Comp. Zool.*, **77**(6): 243-383.

MITCHELL, F. J.

1950. The scincid genera *Egernia* and *Tiliqua* (Lacertilia). *Rec. South Australia Mus.*, **9**: 275-308.
1955. Preliminary account of the Reptilia and Amphibia collected by the National Geographic Society — Commonwealth Government — Smithsonian Institution Expedition to Arnhem Land. *Rec. South Australia Mus.*, **11**: 373-408.
1958. Adaptive convergence in Australian reptiles. *Australian Mus. Mag.*, **12**: 314-317.

MITTLEMAN, M. B.

1952. A generic synopsis of the lizards of the subfamily Lygosominae. *Smithsonian Misc. Coll.*, **117**(17): 1-35.

SMITH, M. A.

1935. The fauna of British India. Reptilia and Amphibia. Vol. II — Sauria., xii + 440 pp., Taylor and Francis, London.
1937. A review of the genus *Lygosoma* (Scincidae: Reptilia) and its allies. *Rec. Indian Mus.*, **39**(3): 213-234.

WAITE, E. R.

1929. The reptiles and amphibians of South Australia. 270 pp., Harrison Weir, Govt. Printer, Adelaide.

TABLE 1

The differences in external characters between the genus *Lerista* and the two groups most closely related to it.

	<i>Lerista</i> (28 species)	<i>Hemiergus</i> (5 species)	<i>solomonis</i> group (8 species)
Nasals	Proportionately enlarged	Not so.	Not so.
Digital formula	2 species with 5-5; all others with 4-4 to 0-1.	1 species with 5-5; all others with 4-4 to 2-2.	All species with 5-5.
External ear opening	Present but small to minute.	Absent, indicated by a depression.	Large, well defined.
Lower eyelid	With a clear "window."	With a clear "window."	Scaly.
Supraoculars	2-4 (usually 3).	Always 4.	Always 4.
Frontoparietals/ interparietal	2/1, 1/1, 1	2/1, except in <i>H. initiale</i> which has 1/1.	2/1
Supradigital scales (4th toe)	Series of single scales.	Series of paired scales.	Series of two or more scales.
Subocular scale row	Incomplete, supralabial borders small scales of eyelid throughout most of its length.	Complete, except in <i>H. initiale</i> in which the upper posterior half of the supralabial borders the small scales of the eyelid.	Incomplete, upper posterior half of supralabial borders small scales of eyelid.

TABLE 2

The species of *Lerista* with a summary of some of their diagnostic characters and distribution.

	Condition of eye	Digital formula	Frontoparietals/ interparietal	Color pattern	Distribution
<i>microtis</i> * (Gray, 1845)	R ¹	5-5	2/1	White lateral stripe bordered above and below by a black stripe.	South Western Australia and South Australia.
<i>bougainvilli</i> * (Duméril and Bibron, 1839)	R	5-5	2/1	Black lateral stripe.	South Australia and Victoria.
<i>tetradactyla</i> * (Lucas and Frost, 1895)	R	4-4	2/1	Blackish lateral stripe, lower edge of which is hardly dis- tinct from darker ground color of sides.	Northern Territory and South Australia.
<i>elegans</i> * (Gray, 1845)	A	4-4	2/1	Black lateral band edged be- low with a narrow white line.	Far western Australia.
<i>distinguenda</i> * (Werner, 1910)	A	4-4	2/1	Similar to <i>elegans</i> .	Far southwestern Australia.
<i>orientalis</i> (de Vis, 1888)	A	4-4	2/1	Flanks blackish, well defined above, below passing into smooth buff of venter.	Northwest Queensland and Groote Eyelandt, Northern Territory.

¹ The species which I have examined as alcoholics are indicated by an asterisk(*). Under the heading "condition of eye," an R indicates a movable eyelid, and an A indicates an "ablepharine" eye; that is, there is a permanent spectacle covering the eye.

<i>terdigitata</i> (Parker, 1926)	R	3-3	2/1	Well defined dark dorsolateral band.	Nuyt's Archipelago and the Investigator Group.
<i>fragilis</i> * (Günther, 1876)	R	3-3	1/1	Sides blackish, the color becoming more sharply defined posteriorly.	Queensland.
<i>muelleri</i> * (Fischer, 1881)	A	3-3	2/1	Dark lateral band.	Far west central Australia.
<i>timida</i> * (de Vis, 1887)	A	3-3	1/1	Black dorsolateral band.	South central Queensland south to Victoria and west through central Australia to far western Australia.
<i>planiventralis</i> * (Lucas and Frost, 1902)	R	2-3	2/1	Dark dorsolateral stripe.	Central Northern Territory and western South Australia west to central Western Australia.
<i>goerlingi</i> (Ahl, 1935)	R	2-3	1/1	Dark dorsolateral stripe.	Known only from the type locality: Marloo Station, Wurarga, Western Australia.
<i>macropisthopa</i> (Werner, 1903)	R	2-3	2/1	Brown color of dorsum fades into yellowish color of venter.	Queensland.
<i>lineata</i> * (Bell, 1833)	A	2-3	2/1	Dark brown lateral band.	Far southwestern Australia.

TABLE 2 (Continued)

The species of *Lerista* with a summary of some of their diagnostic characters and distribution.

	Condition of eye	Digital formula	Frontoparietals/ interparietal	Color pattern	Distribution
<i>walkeri</i> (Boulenger, 1891)	R	2-2	1/1	Each scale of dorsum with a black spot; spots largest on the 4th scale row from the midline.	Roebuck Bay and Condillac Island, northwestern Australia.
<i>gerrardi</i> * (Gray, 1864)	R	1(2)-2	2/1	Dorsum with 3 broad, dark brown longitudinal bands.	Far southwestern Australia.
<i>punctatovittata</i> * (Günther, 1867)	R	1(2)-2	2/1	Each scale of dorsum with a black spot, the spots forming 6 to 8 longitudinal rows.	Southeastern quarter of Australia and Tasmania.
<i>picturata</i> (Fry, 1914)	R	1("bud")-2	2/1	Dark lateral band.	Southwestern Australia.
<i>lineopunctulata</i> * (Duméril and Bibron, 1839)	R	1-2	1	Each scale of dorsum with a dark brown spot.	West central coastal areas of Western Australia.
<i>nichollsi</i> * (Loveridge, 1933)	R	1("bud")-2	1	Dorsum with 3 broad dark longitudinal bands.	Known only from the type locality: Dalganger Station, Western Australia.
<i>miopa</i> * (Günther, 1867)	R	1("bud")-1(2)	1	Dorsum with 4 rows of dots.	Far west central Western Australia.

<i>nigriceps</i> (Glauert, 1962)	R	1 ("bud")-1	1	Dorsum lacks bands, head black.	Known only from the type locality: NW Cape, Western Australia.
<i>wilkinsi</i> (Parker, 1926)	R	0-2	2/1	Dorsal and lateral scales each with a brown dot.	Known only from the type locality: Torrens Creek, Queensland.
<i>bipes</i> * (Fischer, 1882)	R	0-2	1	Dark dorsolateral stripe.	Northern Territory and South Australia west through Western Australia.
<i>praepedita</i> * (Boulenger, 1887)	R	0-1	1	Dark brown lateral band.	West central coastal areas of Western Australia south to the vicinity of Perth.
<i>stylis</i> * (Mitchell, 1955)	R	0-1	2/1	Dark dorsolateral stripe.	Arnhem Land and Groote Eyelandt, Northern Territory.
<i>karlschmidti</i> (Marx and Hosmer, 1959)	R	0-1	2/1	Many (14) narrow longitudinal dorsal and lateral stripes composed of short dashes.	Known only from the type locality: Woodstock, north central Queensland.
<i>allanae</i> * (Longman, 1937)	R	0-1	2/1	Scales mostly bordered with darker markings, these dark spots forming 5 almost continuous lines on the back.	Central Queensland.



Greer, Allen E. 1967. "A new generic arrangement for some Australian scincid lizards." *Breviora* 267, 1–19.

View This Item Online: <https://www.biodiversitylibrary.org/item/25367>

Permalink: <https://www.biodiversitylibrary.org/partpdf/17156>

Holding Institution

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Sponsored by

Harvard University, Museum of Comparative Zoology, Ernst Mayr Library

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.