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Gerrhonotine Lizards Recently Added to the American Museum Collection, with Further Revisions of the Genus

Abronia

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During the past few years the American Museum of Natural History has acquired a number of specimens of gerrhonotine lizards from various Mexican and Central American localities. These acquisitions include several representatives of previously undescribed or otherwise noteworthy forms. Mr. Charles M. Bogert, Curator of Amphibians and Reptiles at that institution, has generously permitted me to examine this collection and prepare this report thereon. I wish to acknowledge my appreciation for this opportunity, for the helpful suggestions he has offered, and for his cooperation in other respects. I also wish to thank Dr. Edward H. Taylor of the University of Kansas Museum of Natural History for his permission to examine comparative material in his personal collection, and in the University of Kansas collection, and also for his assistance in other respects.

The supplementary notes concerning the genus *Abronia* are drawn in large part from material submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the University of Rochester, but with the addition of numerous subsequent observations. During that period I have become indebted to a large number of persons, besides those mentioned above, for their interest and assistance. I particularly wish to acknowledge my indebtedness to Dr. Sherman C. Bishop, now deceased, and Dr. Hobart M. Smith, now of the University of Illinois,

both formerly of the University of Rochester, under whose guidance the study of this genus and related forms was first undertaken.

Abronia oaxacae (Günther)

Since the original description of this form by Günther in 1885, no further records of the species have appeared in print, with the exception of the brief statement by Smith and Taylor (1950), that it has been "reported definitely only from 'Luvina, Tehuantepec, Oaxaca.'" That statement, and the data summarized here, are based on a specimen in the present collection (A.M.N.H. No. 65809) collected by T. C. MacDougall on March 4, 1946, from Luvina (Rancho Ocote), Tehuantepec, Oaxaca. This locality has an elevation of only about 300 feet, and if the specimen actually was taken here, rather than at some near-by point of higher altitude, it represents by far the lowest altitude at which any member of the genus has been found.

As far as I am aware, this is the only specimen of *oaxacae* other than the types that has ever been collected, and the only specimen in any collection in North America. It agrees with the description and figure of the types in all respects that are considered diagnostic. As in all members of the *deppii* group of the genus, the postmental is paired, and there are no protuberant supra-auricular scales. The sides of the neck are agranular, covered with relatively large scales, as in *A. deppii* and *A. t. taeniata*. There are three primary and three secondary temporals. Two primary temporals and the penultimate supralabial are in contact with the orbit. There are no anterior canthals. The minimum number of scales in any single row across the nape is four, a condition found otherwise only in *A. t. graminea*.

Other characters of this specimen include: no postrostral; frontonasal present, separated from the frontal by the prefrontals; two superposed postnasals; supranasals present, unexpanded; an anterior loreal and posterior cantholoreal, no separate canthals; subocular series somewhat reduced posteriorly, not extending to the temporals; three lateral supraoculars; four to five superciliaries, the anteriormost enlarged, appearing almost to form a part of the lateral supraocular series. Nine supralabials, eight infralabials. Dorsals and ventrals each in 14 longitudinal rows; dorsals in 29 or 30 transverse rows between occipital and posterior border of the thigh; 93 caudal whorls. The dorsal osteoderms are very weak over the posterior part of the body in this specimen, but it is not completely mature, and it is possible that they would be well developed

over the entire body in completely adult examples. The dorsal color is primarily green, as in all members of the group excepting the brown *A. deppii*.

Measurements (in mm.) of this specimen are:

Snout to vent	52.0
Tail	86.0
Axilla to groin	25.0
Fore leg	13.0
Hind leg	16.0
Snout to posterior border of ear	14.3
Greatest width of head	9.0

Abronia deppii (Wiegmann)

One specimen (A.M.N.H. No. 72543) is from the vicinity of Chilpancingo, Guerrero, the only region from which this form is known. It appears to be perfectly typical of the species. The postmental is paired, and there are no protuberant supra-auricular scales. Dorsal osteoderms are developed only in the three or four anteriormost rows of dorsals; the scales of the neck are relatively large. There are three primary and three secondary temporals, with only the lowest primary in contact with the orbit; the penultimate supralabial is in contact with the orbit. Three temporal elements are in contact with the supralabials. The dorsals are in 27 transverse rows (27–30 is the observed range within the species); the minimum number of scales in any nuchal row is six. Caudal whorls are 83 in this specimen; the observed range in the species is 73 to 83. Supranasals are present, unexpanded; the parietal of each side is separated from the medial supraoculars.

The absence of any green in the color pattern is a characteristic of this species. The dorsum is brown to brownish black, with six or seven darker cross bands that are often, as in the present specimen, very indistinct. This specimen also lacks any white-tipped lateral scales such as are found in occasional individuals.

Abronia bogerti, new species

TYPE AND TYPE LOCALITY: A.M.N.H. No. 68887, subadult male, obtained in 1948 by Thomas C. MacDougall, north of Niltpec, between Cerro Atravesado and Sierra Madre, Oaxaca, Mexico, probably between 2500 and 4500 feet.

RANGE: Known only from the type.



FIG. 1. *Abronia oaxacae*, A.M.N.H. No. 65809. Actual snout to vent length, 52 mm.

FIG. 2. *Abronia deppii*, dorsal aspect.

FIG. 3. *Abronia bogerti*, holotype, A.M.N.H. No. 68887. Actual snout to vent length, 64 mm.

DEFINITION: An *Abronia* of the *deppii* group (paired postmental; no protuberant supra-auricular scales) with dorsal osteoderms developed in only a few of the anterior scale rows; a single primary temporal in contact with the orbit; penultimate supralabial in contact with the orbit; parietals broadly in contact with the medial supraoculars; anterior canthals present; about 41 transverse rows of dorsals; minimum number of scales in any single row across the nape eight.

DESCRIPTION OF HOLOTYPE: A transverse row of four anterior internasals, two on each side of the midline, separates the nasal from the rostral. Frontonasal present, not in contact with the frontal. Supranasals present, unexpanded; two superimposed postnasals. An anterior loreal, posterior cantholoreal, and anterior canthal on each side, the loreocanthal in contact with the frontonasal. The parietal is in broad contact with the medial supraoculars. Five medial and three (left) or four (right) lateral supraoculars; five superciliaries, the anterior not in contact with the prefrontals; one preocular, three postoculars, and two suboculars, the latter not extending as far as the temporals. Nine (left) or 10 (right) supralabials, of which only the last two follow the orbit; infralabials eight; postmental paired. The arrangement in the temporal region is unique in the *deppii* group, strongly suggesting the condition seen in some members of the *aurita* group. There are only two primary temporals, the lower very large and the upper very small, not in contact with the orbit; three secondary temporals. Only two temporal elements, the lower primary and the lowest secondary, are in contact with the supralabials.

There are 41 transverse rows of dorsals between the occipital and the posterior border of the thigh, and 14 longitudinal rows counted at mid body. No row of scales across the nape contains fewer than eight scales. The sides of the neck are subgranular, with relatively large scales. The ventrals are in 54 or 55 transverse and 12 longitudinal rows, with a reduction to 10 in some rows near the fore limbs. The apparently undamaged tail has 105 rows of caudals.

The dorsal ground color is greenish, with easily visible but irregular and rather poorly defined, brownish cross bars; there are about 10 or 11 such cross bars on the neck and body. It is uncertain whether this is the adult pattern, but, as judged from specimens of other species, the pattern in a specimen of this size usually approaches that of the adult fairly closely. The ventral surface exhibits no strong markings, but many scales have a small black spot at their posteromedial corners, producing an inconspicuous appearance of longitudinal dark lines between the scale rows.

Measurements (in mm.) of the holotype are:

Snout to vent	64.0
Tail	113.0
Axilla to groin	33.0
Fore leg	14.0
Hind leg	19.0
Snout to posterior border of ear	13.2
Greatest width of head	7.8

DISCUSSION: The paired postmental, the relatively large scales of the sides of the neck, and the loss of osteoderms posteriorly suggest that this form has affinities with the *deppii* group of the genus. The fact that only one primary temporal is in contact with the orbit might at first indicate a close relationship with *deppii* itself. However, the general arrangement of the scales of the temporal region is not at all like that in *deppii*, but more nearly like that found in some of the *aurita* group. The broad contact of the parietal with the medial supraoculars and the relatively large number of dark cross bars on the neck and body also suggest the *aurita* rather than the *deppii* group.

No form in either group has previously been known with as many as eight scales in all the rows across the nape. No form in the *deppii* group approaches this one in the high number of transverse dorsal scale rows; the nearest is *A. t. taeniata*, with an observed maximum of 36; in the *aurita* group, only the Chiapan *matudai* is comparable to *bogerti* in this feature.

In many respects, this form probably must be regarded as the most generalized of the known *Abronia*. The arrangement of the temporals and parietals and the partial loss of osteoderms are undoubtedly specialized features, but most of the other characteristics of the species are to be regarded as primitive. I am inclined to believe, until further evidence is available, that the possession of four anterior internasals in a single transverse row behind the rostral is an individual variant in this particular specimen, rather than a characteristic of the species. This is probably the condition from which, in some genera, the two anterior internasals were derived by loss of the medial elements, or their fusion with the corresponding lateral elements, and from which was also derived, in other groups, the postrostral, by fusion of the two medial elements with each other. The four elements appear occasionally as a variant in other species of *Abronia* and very rarely in some individuals of one of the other genera.

It would easily be possible to derive the present members of both the *aurita* and the *deppii* groups from an ancestor similar to this form but lacking its temporal and osteodermal specializations.

I take pleasure in naming this species for Mr. Charles M. Bogert, in recognition of his contributions to our knowledge of Mexican herpetology, both directly and through the encouragement, assistance, and cooperation he has so generously given to other workers in that field.

Gerrhonotus liocephalus liocephalus Wiegmann

Two specimens in the collection are referred to this subspecies, one (A.M.N.H. No. 68125) from Cerro Arenal, near Tenango, Oaxaca, and the other (A.M.N.H. No. 71396) from El Otatal, Tuxtla Gutierrez, Chiapas. The latter was collected at an altitude of 1000 meters.

I have been unable to distinguish these two specimens from typical *liocephalus*, as that subspecies is now understood. Both have 14 longitudinal and 51 to 52 transverse rows of dorsals. There are three loreocanthal elements on each side; the dorsal transverse bands are very indistinct, and the venter is virtually unmarked; the second primary temporal is not in contact with the fifth medial supraocular. Both differ from the majority of specimens of this subspecies in the possession of a greater number of supralabials, 12 on each side in the Chiapan specimen and 13 on one side, 12 on the other, in the Oaxacan example. Normally the total number in *l. liocephalus* is fewer than 24 on the two sides. But this is not an absolutely constant character, and in the present instance I am of the opinion that individual, rather than geographic, variation is involved, especially because other specimens I have seen from the same general region as the Oaxacan specimen all show a lower, more typical supralabial number. The tail is damaged in both individuals, as in the great majority of all specimens of this species, so that no conclusions regarding relative tail length may be drawn.

It is probable that the subspecies *liocephalus* as now recognized is in fact a complex of at least two different races. Better collections from a number of localities within its range are necessary before such races, if they exist, can be satisfactorily defined.

Gerrhonotus liocephalus taylori, new subspecies

HOLOTYPE AND TYPE LOCALITY: A.M.N.H. No. 67918, immature male, taken by George M. Bradt, February 7, 1947, at Clarines Mine, about 5 miles west of Santa Barbara, Chihuahua, Mexico, at an altitude of about 6800 feet.

PARATYPE: A.M.N.H. No. 68235, also an immature male, from Santa Barbara, Chihuahua, 6300 feet, taken on May 6, 1947, by George M. Bradt.

RANGE: Known only from these two specimens.

DIAGNOSIS: A *Gerrhonotus* agreeing with *G. l. infernalis* in possessing a total of 24 or more supralabials on the two sides together, usually four or more loreocanthal elements on each side, distinct transverse dorsal markings, and in the lack of contact between the second primary temporal and the fifth medial supraocular; differing in the possession of a greater number of transverse dorsal scale rows (55–56, as compared with 45–54 in *infernalis*), in the possession of 14 longitudinal rows of ventrals instead of the usual 12 in *infernalis*, and probably in details of color pattern.

DESCRIPTION OF HOLOTYPE: Postrostral present; nasal separated from the rostral by the anterior internasals; supranasals slightly expanded, in contact with the postrostral. Two superposed postnasals; two loreals and two canthals on the left, only one (posterior) canthal on the right, but the anterior obviously fused with the posterior internasal; one preocular on the left, two superposed on the right; two suboculars on the left, not extending to the lowest primary temporal, three on the right, reaching the temporal; four postoculars. Frontonasal broader than long, not in contact with the frontal nor with the posterior canthals; frontal in contact with the interparietal. Six superciliaries, the anterior-most not in contact with the prefrontal. Four primary and four secondary temporals, the uppermost primary in contact with the uppermost secondary, and the lowest primary with the two lowest secondaries, although only very narrowly with the upper of these; the second primary temporal is separated from the fifth medial supraocular by a contact between the third temporal and the uppermost postocular. Supralabials 13, infralabials 12; six or seven sublabials, extending anteriorly to the postmental and the second infralabials; postmental paired.

Dorsals in 18 longitudinal rows, the lateral rows somewhat reduced; 56 transverse rows between the occipital and the posterior border of the thigh. A minimum of 10 scales in any single row across the nape. Ventrals in 14 longitudinal and 68 transverse rows.

Dorsum a light grayish brown, with light grayish white cross bands, somewhat V-shaped, with the apex directed posteriorly; the light cross bands are bordered posteriorly with dark brown, some also with a narrow, interrupted dark brown border anteriorly; about eight or nine such cross bands on the neck and body. Venter with conspicuous black longitudinal stripes along the middle of each scale row, more diffuse laterally than medially, and tending to fan out onto the infralabials anteriorly.

DESCRIPTION OF PARATYPE: This specimen agrees with the description of the holotype except as here noted. Three loreals and two canthals

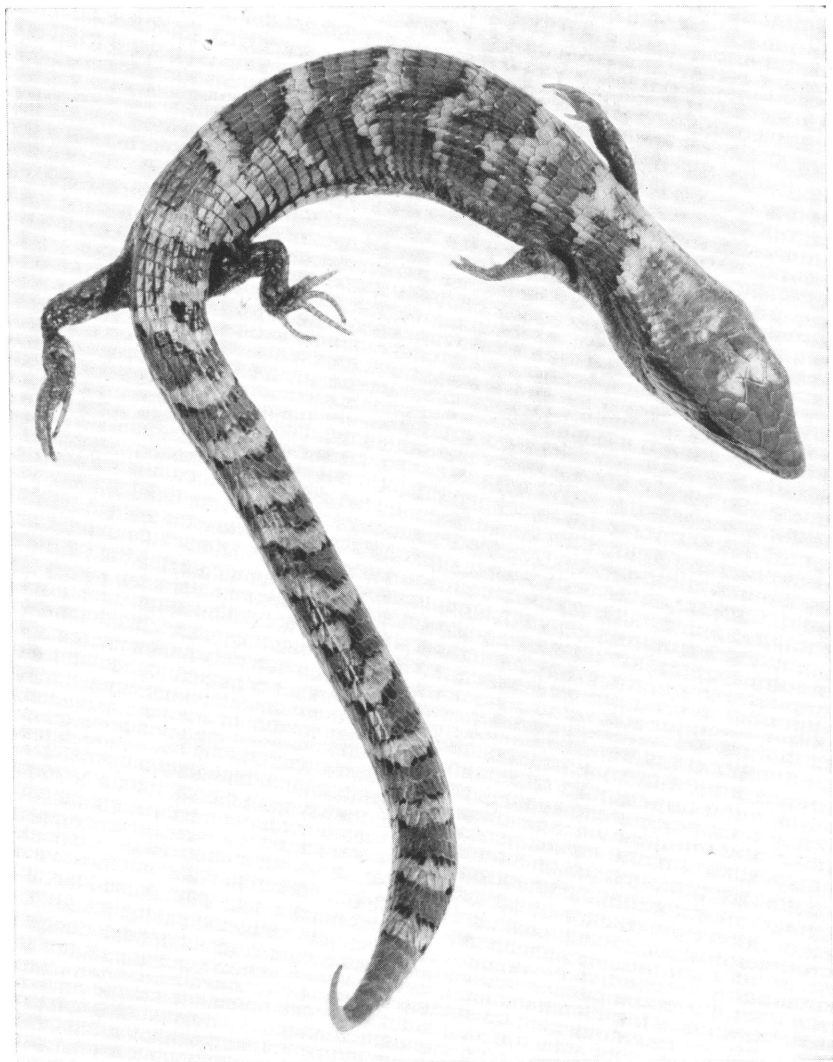


FIG. 4. *Gerrhonotus liocephalus taylori*, holotype, A.M.N.H. No. 67918. Actual snout to vent length, 75 mm.

on each side; one preocular on the right, two superposed on the left; two suboculars on each side, not quite extending to the temporals; three postoculars on the right. The lowest primary temporal is in contact with only the lowest secondary. There are small, roughly triangular, anomalous scales intercalated between the dorsal portions of the third and

fourth and the fourth and fifth supralabials on the left, between these and also between the fifth and sixth on the right. Infralabials 10-11. Dorsals in 55 transverse rows.

Measurements (in mm.) are :

	HOLOTYPE	PARATYPE
Snout-vent ¹	75.0	62.0
Axilla to groin	43.0	33.0
Fore leg	15.5	14.0
Hind leg	18.0	15.0
Snout to posterior of ear	16.0	13.8
Greatest width of head	9.5	7.8

DISCUSSION : This form is clearly most closely related to *G. l. infernalis*, the most important difference being the greater number of dorsal scale rows in *taylori*. The latter would appear to be very similar to *loweryi* in this respect, and it is to be expected that a series of this form would exhibit about the same degree of overlap with *infernalis* as does *loweryi*. In all other respects it resembles *infernalis* more closely, with the possible exception of tail length, which cannot be determined on the basis of the present specimens.

The possession of 14 ventral scale rows will distinguish this form from most *infernalis* (as well as all other subspecies), but in a single series (in the collection of the Museum of Comparative Zoölogy) of that subspecies from the vicinity of Alvarez, San Luis Potosí, nearly 50 per cent of the specimens have 14 scales in at least some of the ventral rows. There is no tendency whatsoever for a higher dorsal scale count in that series than in specimens from Coahuila and Texas.

The color pattern in these two specimens is almost certainly not the adult pattern, but differs somewhat from the pattern in any *infernalis* of comparable size. The proportion of "white" to dark brown in the dorsal cross bands is greater here than in comparable *infernalis*, and the ventral lines are more prominent, with less tendency to break down into a mottled pattern. Whether or not these differences are constant, and whether any corresponding differences exist in the adult pattern, can be determined only after additional specimens are obtained.

In general, *infernalis* usually has only 16 longitudinal rows of dorsals, but an additional row on each side, greatly to only slightly reduced in size, is of frequent enough occurrence that no particular significance can be attached to this feature.

I am pleased to name this form for Dr. E. H. Taylor, in recognition

¹ The tail in both specimens has been broken rather near the base and regenerated.

of his outstanding contributions to the study of Mexican herpetology, and as a token of my gratitude for the inspiration and assistance he has afforded me over a period of years.

Barisia monticola (Cope)

Three specimens (A.M.N.H. Nos. 69637–69639) from El Volcán de Chiriquí, Panama (8000 to 11,000 feet), and one (A.M.N.H. No. 69724) from Volcán Irazu, near Cartago, Costa Rica (8000 feet), are included in the present collection.

These appear to be characteristic representatives of the species, except for the possession by one Panamanian specimen of a paired postmental. The dorsals in all are in 16 longitudinal rows, the number of transverse rows varying from 45 to 51; 12 longitudinal rows of ventrals. Supranasals are present in all the Panamanian specimens, absent in the Costa Rican. The frontonasal is broadly in contact with the frontal in one Panamanian example, narrowly so in a second, and separated from it in the third and in the one from Costa Rica. Prefrontals are present, moderate in size, in all except the one Panamanian specimen. There are two lateral supraoculars in all, except one from Chiriquí which has three. In the Costa Rican specimen the uppermost primary temporal is in contact with the uppermost secondary, separated therefrom in all three from Panama. The lowest primary temporal is in contact with only the lowest secondary, except in one of the Panamanian specimens in which it is in contact with the two lowest. The number of supralabials varies from eight to 10.

Barisia gadovi gadovi (Boulenger)

This form is represented by eight specimens (A.M.N.H. Nos. 72535–72542) from the vicinity of Chilpancingo, Guerrero, the only region from which this subspecies is known. They were collected by W. W. Brown, from October, 1951, to March, 1952.

In three of the specimens a postrostral is present but is lacking in the remainder. All have unexpanded supranasals, two superposed postnasals, two loreals, and one (anterior) canthal, the anterior canthal in contact with the anterior loreal; in one specimen a posterior canthal is also present on one side. The frontonasal is present, in contact with the frontal or not. Superciliaries vary from three to six, the anteriormost in contact with the prefrontal in only one specimen. One or two suboculars, extending to the lowest primary temporal. Supralabials nine or 10 in about equal frequency. The postmental is consistently paired.

The minimum number of scales in any single row across the nape is

eight in all specimens. Ventrals are in 12 longitudinal rows, and dorsals in 16 longitudinal and 46 to 52 transverse rows. Three specimens with undamaged tails have 84 to 87 caudal whorls. The scales of the neck and the lateral scales of the dorsum are keeled. The venter is spotted or mottled with black.

Barisia imbricata imbricata (Wiegmann)

Four specimens from the Mexican state of Mexico, including three (A.M.N.H. Nos. 71333–71335) from Nevado de Toluca at 9800 to 11,700 feet, and one (A.M.N.H. No. 67714) from Mt. Popocatepétl, about 24 kilometers east of Amacameca, at 13,000 feet, all appear to be perfectly typical of this subspecies. All have 12 rows of ventrals, one loreal, and no canthals. Dorsals in 39 transverse rows in three, 43 in the fourth, and 14 longitudinal rows in all, though the lateral rows may be much reduced. The first superciliary is present, moderate in size or rather small, separating the preocular from the first medial supraocular in all specimens but one. The lowest primary temporal is in contact with the penultimate and antepenultimate supralabials.

Barisia imbricata ciliaris (Smith)

Two specimens from southern Durango (A.M.N.H. No. 68357 from 10 miles east of El Salto and A.M.N.H. No. 68388 from near Otinapa) are referred to this form. Both have 12 rows of ventrals and 16 rows of dorsals, although the lateral row of dorsals in one is so strongly reduced that it might more properly be considered to have only 14. There are 41 transverse dorsal scale rows in one specimen, 42 in the other. The first superciliary is rather large, separating the preocular from the first medial supraocular. The lowest primary temporal is in contact with the penultimate and the antepenultimate supralabials. Both have one loreal; in the Otinapa specimen a canthal is split off the dorsal part of the loreal on each side. The coloration appears typical of this form.

SUPPLEMENTARY NOTES ON THE GENUS *ABRONIA*

I have previously (1949) proposed the revival of the generic name *Abronia* Gray, 1838, for that group of gerrhonotine lizards containing the species *deppii*, *aurita*, and a number of related forms. At the present time, it seems desirable to modify slightly the generic definition there proposed, to discuss the desirability of generic status for this group, and to present brief descriptions of the forms comprising it.

This genus, ranging from Guatemala and Chiapas northwestward to

Guerrero and northward to southern Tamaulipas and San Luis Potosí, may be defined as follows: gerrhonotine lizards with a widened, depressed skull; all otic and occipital elements fused into a single compound bone; sides of the neck mostly covered with scales or with large, closely approximated granules. Pterygoid teeth lacking; no postrostral; two loreals; anterior internasals present, separating the nasal from the rostral; fewer than 45 transverse rows of dorsals; subocular series normally not extending to the temporals.

DISCUSSION: Any of the first three characteristics listed will distinguish this genus from all other Recent gerrhonotine genera. Osteological features are unfortunately of no practical assistance in the identification of individual specimens, and the condition of the side of the neck is to some extent a comparative character, therefore perhaps sometimes difficult to recognize with certainty when comparative specimens are not available. Any one of the remaining characters listed will distinguish lizards of this genus from those in one or more of the other genera or species groups, but no one of these will distinguish it from all others simultaneously. They are, however, "convenient" characters for recognition of the genus. These latter characters are discussed briefly, then a fuller discussion of the unique characteristics of the genus is given.

The failure of the suboculars to reach the anterior temporals is not an absolutely constant feature, exceptions having been observed on one or both sides of a very few *A. t. graminea*—about 3 per cent of the total number of specimens seen of this form. No exceptions have been observed in any other form of the genus. I do not consider this minor inconsistency to constitute a deterrent to the use of this feature as an aid in identification.

Abronia may be distinguished from both *Elgaria* and *Gerrhonotus* by the absence of well-developed pterygoid teeth. This is, it is true, an osteological feature, but one that is easily determined. In addition, the presence of anterior internasals, separating the nasal from the rostral, and probably also the failure of the suboculars to reach the temporals, distinguish this genus from *Elgaria*. The lack of a postrostral and the small number of transverse dorsal scale rows are additional characters distinguishing it from *Gerrhonotus*.

Only the failure of the suboculars to reach the temporals will distinguish *Abronia* from all forms of *Barisia*; the suboculars extend to the temporals consistently in all *Barisia* (about 400 specimens) that I have seen. The members of the *imbricata* group (except for the unique *B. rudicollis*, in which the nasal is in contact with the rostral) are also distinguished by the possession of only a single loreal. The members of the

gadovi and *moreleti* groups can be distinguished by their greater number of transverse dorsal scale rows.

The value of the condition of the side of the neck as a generic character has perhaps been somewhat obscured by the variation within *Abronia* and by a tendency, indulged in by the present writer among others, to use the term "granular area" rather loosely. Many drawings that have been published tend to show only a general impression of this area, with the details correspondingly inaccurate. In all genera except *Abronia* (and the highly distinctive but problematical *Coloptychon*), virtually the entire area between the humerus and the ear can be described as "granular" with perfect accuracy. Moreover, the granules are very small and well separated from one another. In *Abronia* there may be a few granules, particularly around the ear, but this area as a whole is much better described as containing numerous rather small scales. Sometimes the term granular might be applicable, but if so the "granules" are large in comparison with those of other genera and are at least closely approximated when not actually imbricating. In a few forms the majority of the scales of the side of the neck are not even greatly reduced in size.

The most important feature of the genus from a phyletic viewpoint is, in my opinion, the depression and widening of the skull. This is of course reflected in a number of features involving individual bones and relationships between particular cranial elements. Unfortunately it is reflected in only a general way in the external proportions of the head. The external proportions are so strongly influenced by other factors, notably age and sex, that they are of little value as generic indexes except in extreme cases.

This genus is also unique among the Recent Gerrhonotinae in the complete fusion of all otic and occipital elements into a single bone. In the other genera the exoccipital of each side is fused with the corresponding otic, but the basioccipitals and supraoccipitals remain independent. There are other osteological features (Tihen, 1949) by which this genus can be distinguished from one or more of the related groups but not from all simultaneously.

In connection with this discussion of the osteological features, it is pertinent to point out that the genus *Peltosaurus*, apparently dating from the Paleocene, seems to differ from certain Recent gerrhonotine groups to a lesser extent than these Recent groups differ from one another. The fusion in *Peltosaurus* of the postorbital with the postfrontal is the only obvious consistent distinguishing characteristic of that form. On an osteological basis and in consideration of the rather well-known cephalic

scutellation of *Peltosaurus*, it seems inconsistent to lump all Recent gerrhonotine lizards into a single genus without also including the fossil *Peltosaurus* in the same genus. The affinities of *Peltosaurus*, and of the roughly contemporaneous *Melanosaurus*, are, in my opinion, definitely with the *Gerrhonotus-Ophisaurus* section; rather than with the *Anguis-Celestus* section, of the Anguidae. Bogert (*in litt.*) has suggested that *Melanosaurus* also demonstrates affinities with the Xenosauridae.

Several other features are characteristic of, but not necessarily limited to or universal within, the genus *Abronia*. The osteoderms, where present, in the *deppii* group are extremely heavy and rugose. There is a tendency in that group towards complete loss of the osteoderms. This loss occurs first in the posterior part of the body and reaches an extreme in the species *deppii*, in which only the two or three anteriormost rows of dorsals possess osteoderms. In the *aurita* group the osteoderms are thinner, less rugose, and with a smooth and well-defined, but not greatly thickened, basal portion. This basal portion is lacking or very poorly defined in the *deppii* group. As far as can be determined, osteoderms are present over the entire body in the *aurita* group. The statement in my 1949 discussion of this genus, that the *deppii* group type of osteoderm was the same as that found in *Peltosaurus*, was based on figures of the fossil genus. I have subsequently examined specimens of that form and find that these figures were misinterpreted. The osteoderms of *Peltosaurus* are moderately heavy and rugose but not excessively so, and they do possess a very distinct, smooth, greatly thickened basal portion, such as is found in all Recent genera except *Abronia*. Because of variations due to the age of the individual specimen and the exact position on the body, these elements do not constitute a satisfactory taxonomic character except for their presence or absence.

The legs are long and strongly developed in this genus as compared to those of the other gerrhonotine genera. This is quite possibly a corollary of the arboreal habits of the members of this group. This habitat may also have been a factor in the development of the color patterns, with the predominance of greens and some gray-browns. The dorsal coloration is always either nearly uniform or with transverse bands; there is no suggestion of any of the longitudinal pattern elements characteristic of most *Barisia* and of many *Elgaria*. The lateral fold is very weakly developed in *Abronia*; all other groups have a broad, well-defined fold, except a few *Barisia* of the *moreleti* and perhaps *gadovi* groups, in which the condition may approach that found in *Abronia*.

The minimum number of scales in any nuchal row is usually six; it

may be as low as four in certain forms, and eight in only one. In other genera this number is usually eight to 10 and as low as six in only a few *Barisia*.

There is a strong tendency to reduce the number of elements in the temporal region. Throughout the genus the normal number of secondary temporals is three; the primary temporals are also reduced to three except in the two subspecies of *A. taeniata* and the very closely (perhaps subspecifically) related *A. fuscolabialis*. In all other genera there are normally four primary and four secondary temporals. In many, but not all, species of this genus there are only two supralabials following the orbit, in other genera usually three.

There is no doubt that the members of the genus *Abronia*, as here defined, comprise a compact and definitely limited group of species within the Gerrhonotinae. Some disagreement apparently exists as to whether this group, with *Elgaria*, *Barisia*, and *Gerrhonotus* (*sensu stricto*), is best divided into separate genera, or combined, perhaps as subgenera, within the single genus *Gerrhonotus*. This subject merits some discussion.

Herpetologists are definitely not in complete agreement as to the proper scope of the generic category. This matter was discussed briefly by Schmidt (1953) who points out that the genus is, or should be, a group of species and is essentially a synthetic, not an analytic, category, based on similarities instead of on differences.

In general I am in agreement with this viewpoint. But this does little towards settling the question of the "proper" scope of the genus. Any systematic category above the species level must be both synthetic and analytic at the same time. A subfamily, for example, is a synthetic category, containing a group of species (whether contained in one genus or several) with a number of certain basic similarities; it is analytic in that certain of these characteristics are different from the conditions found in other subfamilies. In the other direction from the generic level, the informal but widely used category of the species group is also a synthetic group of related species, possessing certain similarities among themselves and certain differences from other species within the genus.

Schmidt suggests that the continuing subdivision of genera, i.e., undue emphasis on the analytic aspects, leads logically to the point at which there is one monotypic genus for each species. Similarly, then, excessive emphasis on the synthetic aspect would lead logically to the point at which there is a single genus for all species within a subfamily, or even a family. No one, of course, has suggested that either of these extremes is correct.

As to the subgeneric category, it has been so consistently and com-

pletely ignored by herpetologists in general, and by American herpetologists in particular, that at the present time it has no real significance. Even Schmidt (1953) mentions only one subgenus in the entire work. It may be recognized that such a category exists, at least theoretically, but it is impossible to determine whether the majority of workers consider it to be more or less synonymous with the "species group" or to represent some category between that level and the generic level. Some European workers tend to use the subgenus as a category between the species group and the genus, but, so far at least, this practice has not been widely accepted or followed.

The various species assemblages within the Gerrhonotinae for which I have proposed generic status are unquestionably on a higher level of differentiation than that of the species group, and I am convinced that generic status is much more consistent with current practice than would be the recognition of several subgenera within a single genus.

KEY TO THE FORMS OF *ABRONIA*

In using this key the reader should bear in mind that most of the forms of this genus are very poorly known (several are represented by only a single specimen). It is therefore impossible to be certain of the consistency of some of the characters used. Only *A. t. graminea* can be considered adequately represented in museum collections, and the great majority of specimens of this form have been collected only within recent years. Sufficient specimens of *A. deppii* are available to provide a reasonably accurate picture of variation within that form, but all others are inadequately known.

- 1. Postmental paired 2
Postmental unpaired 9
- 2. No conspicuously modified supra-auricular scales; supranasals usually present, unexpanded 3
A group of conspicuous, long, slender supra-auricular scales; no supranasals, or supranasals, if present, greatly expanded and in contact with each other along middorsal line 8
- 3. A single primary temporal in contact with the orbit 4
More than one primary temporal in contact with the orbit 5
- 4. Dorsum brown; 27-30 dorsal scale rows; minimum number of scales in any nuchal row six (Guerrero) *deppii*
Dorsum greenish, with brown cross bars; about 40 dorsal scale rows; no nuchal row with fewer than eight scales (Tehuantepec) *bogerti*
- 5. Antepenultimate the posteriormost supralabial to reach the orbit; sides of neck covered with relatively small scales 6
Penultimate supralabial reaching the orbit; sides of the neck mostly covered with large scales (southern Oaxaca) *oaxacae*

6. Dorsal osteoderms well developed over entire body; dorsum uniformly colored in adults 7
 Dorsal osteoderms lacking posteriorly; light marking on sides, giving appearance of dorsal cross bars (northern Veracruz to Tamaulipas) *taeniata taeniata*
7. Dorsal scale rows 25–29; chin and lower labials white, with occasionally a few scattered dark blotches; minimum number of scales in any nuchal row usually (75%) four or five (central Veracruz and adjacent Puebla) *taeniata graminea*
 Dorsal scale rows about 30–31; infralabials darker than chin and as dark as sides of neck, with indistinct lighter bands; minimum number of scales in any nuchal row six (Mt. Zempoaltepec) *fuscoblabialis*
8. Frontonasal present, transverse bands indistinct (Alta Verapaz) *aurita*
 No frontonasal; transverse bands distinct (Alta Verapaz) *fimbriata*
9. Parietal broadly in contact with the medial supraoculars; transverse bands distinct, those of the neck discrete, not combined into a single large dark marking 10
 Parietal separated from or very narrowly in contact with the medial supraoculars; transverse bands lacking to moderately distinct; if present, those of the neck combined into a single large dark marking (Comitán, Chiapas) *ochoterenai*
10. Two temporal elements in contact with the supralabials; about 30 transverse rows of dorsals (western Guatemala). *vasconcelosi*
 Three temporal elements in contact with the supralabials; about 40 transverse rows of dorsals (Volcán de Tacaná, Chiapas). *matudai*

LIST OF SPECIES

“An annotated checklist and key to the reptiles of Mexico” (Smith and Taylor, 1950) gives condensed synonymies and information concerning type specimens for all Mexican forms; such material is given here, therefore, for only those forms not included in that work.

THE *deppii* GROUP

This group is defined as *Abronia* with a paired postmental and without protuberant supra-auricular scales. Thus defined it contains all forms from Tehuantepec northward. In general this group differs from the more southern *aurita* group in several respects, but there is some overlapping of most characters between the two groups, so that the separation is not clearly defined. Members of this group have heavy, rugose osteoderms without a distinct basal portion, or lack these elements over most of the dorsum. The dorsal color may be uniform or, if cross bands are present as in the adults of some forms and the young of all, there are only about seven or eight such bands on the neck and body (except in *A. bogerti*). Supranasals are consistently present, unexpanded. In most forms the parietal is widely separated from the medial supraoculars.

There is a strong tendency for the sides of the neck to be covered with larger scales than in the *aurita* group.

Abronia bogerti

This form, fully described above, is a member of the *deppii* group as above defined, and affinity with that group is also indicated by the relatively large scales of the side of the neck and by the loss of osteoderms posteriorly. However, the contact of the parietal with the supraoculars and the larger number of dorsal cross bars otherwise occur only in the *aurita* group. Both the *aurita* and *deppii* groups may well have been derived from a similar form.

Abronia taeniata taeniata (Wiegmann)

Postmental paired; no protuberant supra-auricular scales; dorsal osteoderms developed anteriorly at least as far back as the level of the fore limbs; sides of the neck with scales of moderate size; two primary temporals in contact with the orbit; the antepenultimate is the posteriormost supralabial to reach the orbit; anterior canthals present or absent; four primary and three secondary temporals; four temporal elements in contact with the supralabials, at least in some specimens; 29 to 36 transverse rows of dorsals; minimum number of scales in any nuchal row six; caudal whorls about 80; supranasals present, unexpanded; parietal separated from the medial supraoculars; dorsal ground color greenish, with conspicuous light areas laterally, giving the impression of seven or eight irregular dark cross bars.

This form is poorly represented in collections, with only one or two specimens from each of several rather widely scattered localities. Definite locality records include: Zacapaoxtla and Ahuacatlán, Puebla; El Chico Hidalgo; Cerro Conejo, San Luis Potosí; and southern Tamaulipas. Four specimens from La Joya, Veracruz, which may represent *taeniata* × *graminea* intergrades, are discussed in connection with the latter form.

Abronia taeniata graminea (Cope)

Postmental paired; no protuberant supra-auricular scales; dorsal osteoderms well developed over the entire body; scales of the sides of the neck relatively small; two primary temporals in contact with the orbit; the antepenultimate is the posteriormost supralabial to reach the orbit; anterior canthals lacking; four primary and three or occasionally four secondary temporals; three or four temporal elements in contact with the supralabials; 24 to 30 transverse rows of dorsals; minimum number of scales in any nuchal row usually (75%) four or five, six in 25 per

cent; caudal whorls 83–94; supranasals present, unexpanded; parietal separated from the medial supraoculars; adults a nearly uniform gray-green or grayish blue (in alcohol) above.

This form is represented in collections by a large number of specimens from a few localities. It is known from Orizaba, Acultzingo, and 3 miles east of Las Vigas, Veracruz, and from Puente Colorado and Pájaro Verde, Puebla. Four young specimens (E. H. Taylor collection Nos. 29266–29269) from La Joya, Veracruz, are tentatively considered to represent an intergrading population with *A. t. taeniata*. All fall within the range of variation of *graminea*, but three have 29 rows of dorsals and one has 30; the probability that four specimens from a typical population have such high scale counts is slight. Both counts fall within the lower portion of the range of *t. taeniata*. Moreover, all four specimens have a minimum nuchal count of six. The dorsal osteoderms seem about as well developed as in *graminea* of comparable size, but the transverse brown bands are somewhat more distinct than is usual in such specimens, more nearly resembling the single young (somewhat larger than the La Joya specimens) *t. taeniata* specimen that I have seen. If intergradation does occur, this is an area in which it might well be expected on a geographical basis, though the near-by Las Vigas specimens are reported to show no evidence of intergradation.

Abronia fuscolabialis (Tihen)

Postmental paired; no protuberant supra-auricular scales; dorsal osteoderms well developed over the entire body; scales of the side of the neck relatively small; two primary temporals in contact with the orbit; antepenultimate supralabial the posteriormost one to reach the orbit; anterior canthals present; four primary and three secondary temporals; three temporal elements in contact with the supralabials; about 30–31 transverse rows of dorsals; a minimum of six scales in any nuchal row; caudal whorls 88; supranasals present, unexpanded; parietal separated from the medial supraoculars; a nearly uniform grayish green above.

This form is known from only two specimens (the holotype and paratype), both from Mt. Zempoaltepec, Oaxaca. Its relationships are clearly with *A. t. graminea*, from which it differs in the possession of anterior canthals, in the somewhat higher number of dorsal scale rows, perhaps in the constant possession of a minimum of six scales in any nuchal row, and in details of color pattern, as described in the key to the species. It is entirely possible that this form bears a subspecific relationship to *graminea*, but such a relationship has not yet been demonstrated.

Abronia oaxacae (Günther) and *Abronia deppii* (Wiegmann)

Both of these forms are described and discussed above.

THE *aurita* GROUP

This group may be defined as *Abronia* with conspicuously protuberant supra-auricular scales, or an unpaired postmental, or both. Thus defined, it includes those members of the genus inhabiting Chiapas and Guatemala. The dorsal osteoderms are usually moderately thin, not extremely rugose, and with a distinct, smooth, but not greatly thickened, basal portion. The dorsal coloration is occasionally nearly uniform, but usually with dark cross bands; there are about 10 or 11 such cross bands, when present, as compared with seven or eight in most of the *deppii* group. Supranasals may or may not be present. The parietal is often in broad contact with the medial supraoculars or only narrowly separated therefrom. The scales, or granules, of the sides of the neck are in general somewhat smaller than in the *deppii* group, with none of these forms having such large scales in that region as *oaxacae* and *deppii*.

Abronia aurita (Cope)

Gerrhonotus auritus COPE, 1869, Proc. Acad. Nat. Sci. Philadelphia, vol. 20, p. 306.

Abronia aurita, TIHEN, 1949, Amer. Midland Nat., vol. 41, p. 591.

TYPE: In the United States National Museum, collected by Henry Hague, from "the neighborhood of . . . Peten and Coban, Guatemala."

Postmental paired; a group of long, slender, supra-auricular scales; dorsal osteoderms presumably developed over the entire body; scales of the sides of the neck relatively small; two primary temporals in contact with the orbit; penultimate supralabial in contact with the orbit; anterior canthals lacking; apparently three anterior and three secondary temporals; two temporal elements in contact with the supralabials; about 29 rows of dorsals; minimum number of scales in any nuchal row six; supranasals lacking (?); parietal in broad contact with the medial supraoculars; dorsal color greenish, with indistinct dark cross bars; frontonasal present.

This form is known only from the type. It is apparently a rather large form, the snout to vent length of the type being given as 5 inches (about 125 mm.), the largest known example of the genus. I have not seen this species, and the above description is drawn from the literature, with some possibility of misinterpretation of certain features.

Abronia fimbriata (Cope)

Gerrhonotus (Abronia) auritus, BOCOURT (*nec* Cope), 1878, Études sur les reptiles et les bacraciens, in Duméril, Bocourt, and Mocquard, Mission scientifique au Mexique et dans l'Amérique Centrale, Recherches zoologiques, p. 337.

Barissia fimbriata COPE, 1885, Proc. Amer. Phil. Soc., vol. 22, p. 171.

Gerrhonotus fimbriatus, GÜNTHER, 1885, Biologia Centrali-Americana, Reptilia, p. 37.

Abronia fimbriata, TIHEN, 1949, Amer. Midland Nat., vol. 41, p. 591.

TYPE: Presumably in the Paris Museum, number unknown. From Alta Verapaz, Guatemala. Cope proposed the name on the basis of the description and figures contained in Bocourt (1878) under the heading of "*auritus*."

Postmental paired; a group of long, slender, supra-auricular scales; dorsal osteoderms presumably developed over the entire body; scales of the sides of the neck relatively small; two primary temporals in contact with the orbit; penultimate supralabial in contact with the orbit; anterior canthals lacking; three primary and three secondary temporals; two temporal elements in contact with the supralabials; about 30 transverse rows of dorsals; minimum number of scales in any nuchal row six; supranasals apparently greatly expanded to meet in middorsal line between the anterior and posterior internasals, as judged from Bocourt's figure; parietal in broad contact with the medial supraoculars; dorsum greenish gray, with conspicuous dark cross bars, about seven on the body in addition to a large dark marking on the neck apparently derived from coalesced cross bars of the region; frontonasal lacking.

This form is known only from the types, of which there are apparently several specimens, from Alta Verapaz. I have seen neither this form nor *A. aurita*. Certain points remain obscure, particularly in connection with the proper interpretation of the scutes of the prefrontal and supranasal region, and also of the temporal region. However, it is probable that the main differences between this form and *aurita* involve the distinctness of the dorsal bands and the presence or absence of the frontonasal. If this is the case, then *fimbriata* is probably a synonym of *aurita*; both forms originated from Alta Verapaz. Further specimens are necessary before this question can be settled.

Abronia ochoterenai (Martín del Campo)

Postmental unpaired; a group of long, slender, supra-auricular scales; scales of the sides of the neck relatively small; dorsal osteoderms developed over the entire body; two primary temporals in contact with the orbit; penultimate supralabial in contact with the orbit or not; anterior canthals usually present; three primary and three secondary temporals;

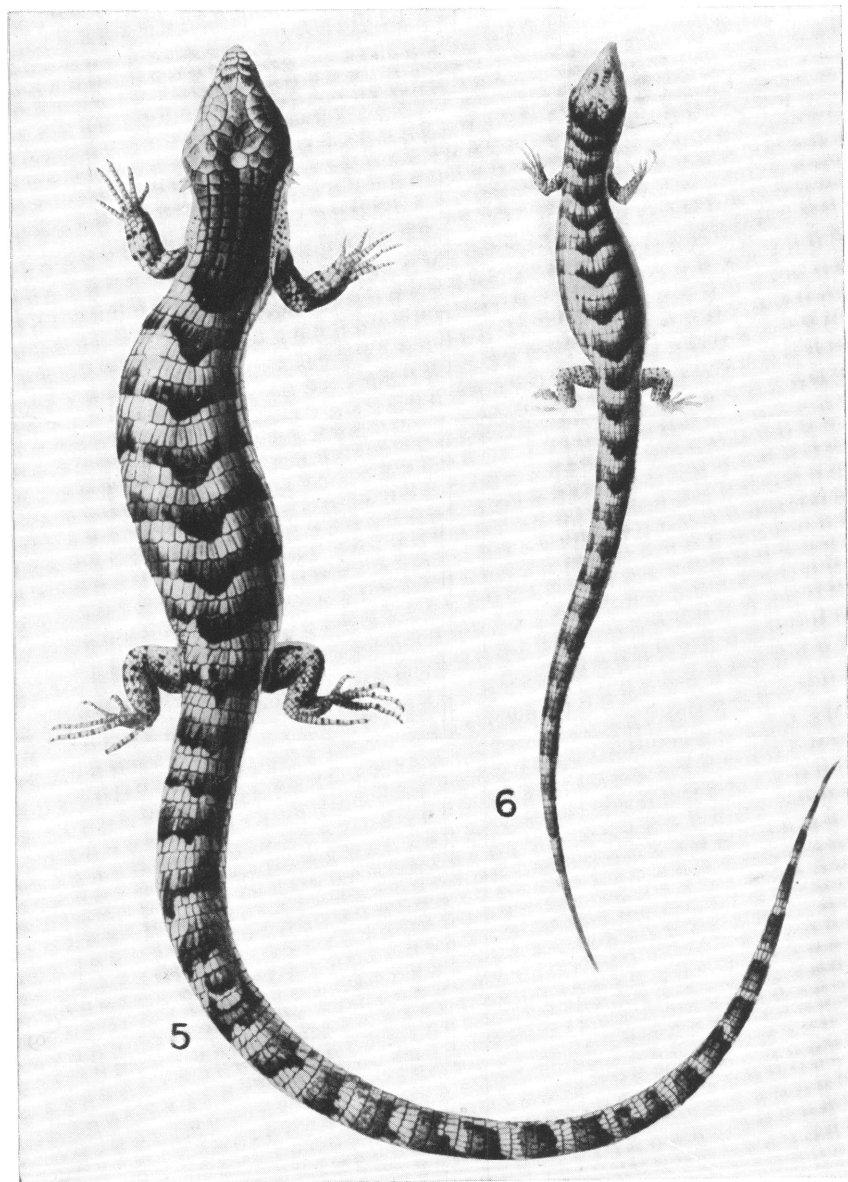


FIG. 5. *Abronia fimbriata*, after Bocourt.

FIG. 6. *Abronia vasconcelosi*, holotype, after Bocourt.

three temporal elements in contact with the supralabials; 30 to 33 transverse rows of dorsals; a minimum of six scales in any nuchal row; caudal whorls 92-97; supranasals usually present; parietal separated from, or only narrowly in contact with, the medial supraoculars; dorsum nearly uniform, sometimes with moderately distinct transverse dark bands, those of the neck combined into a single large dark marking; frontonasal present or absent.

Four specimens are known, all from the vicinity of Santa Rosa, Comitán, Chiapas. The ventrals are in 12 rows in three of the four specimens, 14 in the fourth and in all other members of the group except *matudai*. All other members of the group have the parietal broadly in contact with the medial supraoculars.

Abronia vasconcelosi (Bocourt)

Gerrhonotus vasconcelosii BOCOURT, 1871, Nouv. Arch. Mus. d'Hist. Nat., Paris, vol. 7, p. 107.

Gerrhonotus (*Abronia*) *vasconcelosii*, BOCOURT, 1878, Études sur les reptiles et les bacratiens, in Duméril, Bocourt, and Mocquard, Mission scientifique au Mexique et dans l'Amérique Centrale, Recherches zoologiques, p. 334.

Gerrhonotus [*vasconcelosii*] *vasconcelosii*, MARTÍN DEL CAMPO, 1939, An. Inst. Biol. México, vol. 10, p. 357.

Abronia vasconcelosii, TIJEN, 1949, Amer. Midland Nat., vol. 41, p. 591.

TYPE: In the Paris Museum, collected by M. Vasconcelos at Argueta in western Guatemala.

Postmental unpaired; protuberant supra-auricular scales, but these relatively short and obtuse, at least in the immature type; scales of the sides of the neck moderate; dorsal osteoderms presumably developed over the entire body; two primary temporals in contact with the orbit; penultimate supralabial in contact with the orbit; anterior canthals present; three primary and three (?) secondary temporals; two temporal elements in contact with the supralabials; about 30 transverse rows of dorsals; minimum number of scales in any nuchal row six; supranasals present, unexpanded; parietal broadly in contact with the supraoculars; dorsum green, with about 10 dark cross bands on the neck and body, those of the neck discrete, not combined into a single large marking; frontonasal present.

This form is known only from the type. I have not seen this specimen, but the figures and the description provided by Bocourt are quite clear, allowing all the above-described features to be determined accurately. The type specimen has a snout to vent measurement of only 54 mm., so it is possible that the poorly developed condition of the supra-auricular scales is a juvenile, rather than a specific, character.

Abronia matudai (Hartweg and Tihen)

Postmental unpaired; supra-auricular scales scarcely, if at all, protuberant; osteoderms developed over the entire dorsum; sides of the neck with moderate scales; one primary temporal in contact with the orbit; penultimate supralabial in contact with the orbit or not; anterior canthals present or not; two to three primary and four secondary temporals; three temporal elements in contact with the supralabials; about 39 transverse rows of dorsals; minimum number of scales in any nuchal row six; supranasals present, slightly expanded, but not meeting in the mid-line; parie-

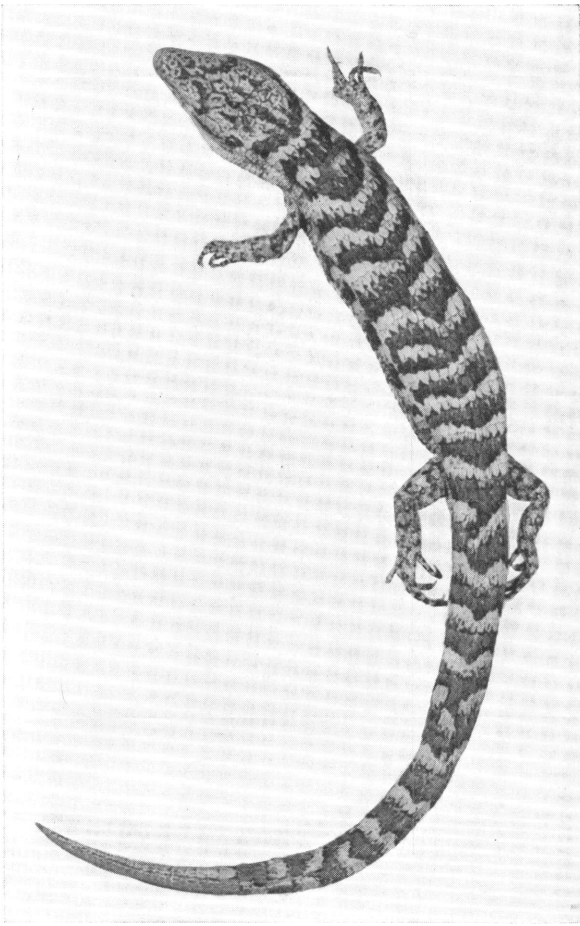


FIG. 7. *Abronia matudai*, holotype, University of Michigan Museum of Zoology No. 88331. Actual snout to vent length, 77 mm.

tal broadly in contact with the supraoculars; dorsum blue gray (possibly green in life), with about 11 dark cross bands, those of the neck discrete, not combined into a single large marking; frontonasal present.

This form is known only from the type. It shows certain strong resemblances to *A. bogerti*, as pointed out in connection with that species, and is quite possibly more closely related to that form than to most members of the *aurita* group, despite the fact that *bogerti* is placed in the *deppii* group. The more important points of difference include the partial loss of osteoderms in *bogerti*, the three temporal elements in contact with the supralabials in *matudai*, the larger number of scales across the nape in *bogerti*, and the paired postmental in that form. The type specimens of the two forms differ in several other respects, as can be seen by a comparison of the original descriptions of the two, but there is some doubt as to whether most of the other differences will prove to be constant and diagnostic.

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