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A NEW GENUS AND SPECIES OF TEIID LIZARD FROM BOLIVIA

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ABSTRACT

Opipeuter xestus, new genus, new species, is placed in Group II of the family Teiidae (Squamata, Reptilia) because it has five clawed digits on all four feet, the nasals separated by a frontonasal, and the nostril pierced in the middle of the nasal scale. It differs from other known members of Group II in having the combination of total absence of keeled scales and a relatively enormous transparent disc in the lower eyelid. The arrangement of enlarged calcareous spines in the hemipenis distinguishes the new taxon; enlarged spines are present on the basal part of the median welt, and in a row on each side of the sulcus spermaticus. The affinities of the new taxon are not with *Prionodactylus,* although most specimens have been identified as *Prionodactylus bolivianus;* the affinities may be with *Euspondylus,* but are not clearly so. Known specimens come from several localities between 1000 and 3000 m above sea level in the headwaters of the Río Chapare on the eastern Andean slopes of central Bolivia.

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Introduction

One of the frequently collected species of Boulenger's (1885) Group II of the Teiidae is regularly but incorrectly identified as *Prionodactylus bolivianus* Werner (1889). I have recently examined the holotype of *Prionodactylus bolivianus* in the Muséum National d'Histoire Naturelle in Paris and a second specimen identified by Werner as *P. bolivianus* in the Zoologische Staatssammlung in Munich. *P. bolivianus* is closely related to *P. okendeni* Boulenger (1906); both have the loreal in contact with the frontonasal and with one or more supralabials, an undivided frontonasal, a variable number (2 or 3) of median collar scales, and simple subdigital lamellae. While *P. bolivianus* agrees with the misidentified species in most of these features, the strong keeling on the dorsal scales, not mentioned by Werner but implied by his generic placement of *bolivianus,* readily distinguishes all *Prionodactylus* from the misidentified form, which has no keeled scales whatsoever.

The misidentified species appears to be unnamed. I here name it, but in so doing, am also obliged to consider its generic assignment. The new species, despite the fact that it has been identified as a member of the genus *Prionodactylus,* does not, in my opinion, belong to that genus. Alternatively, it could be placed in *Euspondylus.* Both *Euspondylus* and *Prionodactylus,* which I believe are only distantly related to each other, or the composite genus *Euspondylus* containing both groups of lizards, have included a wide variety of stocks of Group II of the Teiidae. I have examined members of most of the taxa in Group II, and I am gradually forming generic concepts for them. In my opinion, placing the new species in *Prionodactylus* is impossible, but placing it in *Euspondylus* would only add to the confusion in that overburdened genus. I therefore propose a new genus for the species, with full realization that the generic and specific characters are the same, and the conviction that if I or some other worker can convincingly place the new species in a previously recognized genus, such reassignment will be progress. It is my belief, however, that a new genus is warranted by the characters of the new form. Erecting a new genus draws attention to the distinctive characters of the new species, allows *Euspondylus* and *Prionodactylus* to begin to emerge

as distinctive entities, and constrains the minds of herpetologists less than would placing the new species in *Euspondylus.*

For permission to examine material in collections in their charge, I thank Charles Bogert and Richard Zweifel, American Museum of Natural History (AMNH), Alice G. C. Grandison, British Museum (Natural History) (BMNH), Jean Guibé, Muséum National d'Histoire Naturelle, Walter Hellmich and Dieter Fuchs, Zoologische Staatssammlung, Munich (ZSM), James A. Peters, U.S. National Museum (USNM), Charles F. Walker, University of Michigan Museum of Zoology (UMMZ), and Ernest E. Williams, Museum of Comparative Zoology, Harvard University (MCZ). Travel was supported by the Peabody Museum, Yale University (YPM) and by a gift from Evan Commager. Mario Baudin helped me in determining many of the localities. The illustrations were done by Diane McClure, Jon Janosik, and A. H. Coleman.

CLASS REPTILIA

Order Squamata

family teiidae

Opipeuter, new genus

TYPE SPECIES. **Opipeuter xestus,** new species.

DESCRIPTION. Tongue with imbricate scalelike papillae. Snout moderate. Head scales without striations or rugosities; single frontonasal, frontal, and interparietal; paired prefrontals, frontoparietals, and parietals; a median occipital bordered by two laterals. Nostril pierced in a divided scale, the suture posterior to the nostril; nasals not in contact; loreal and frenoocular present, the former almost always in contact with supralabials; first superciliary expanded onto dorsal surface of head; a single long subocular. Eyelids well developed, the lower with a relatively enormous transparent circular disc without divisions. Ear opening small, tympanum deeply recessed, larger than ear opening. Gular crease weak; collar fold well developed. Gular scales flat, small, and nearly quadrangular anteriorly, flat, larger with rounded posterior margins posteriorly; collar scales 8-10, flat, about as wide as long, with rounded posterior edges. Limbs pentadactyl;

digits clawed. Scales along inner margin of palm between thumb and wrist slightly enlarged, but inner edge not produced. Underside of third and fourth toes with paired scales on proximal part, the inner scale not tuberculate. Dorsal scales smooth, in transverse rows, with rounded posterior edges. Lateral scales reduced in size, rounded in outline, smooth; ventral scales in transverse and longitudinal rows, smooth, posterior margins rounded. Femoral pores present in both sexes, usually fewer in females. Hemipenis with a cluster of enlarged spines on the basal part of the median welt, and with rows of enlarged spines along the edges of the sulcus spermaticus (Fig. 2).

DIAGNOSIS. The widely separated nasal scales, each surrounding a nostril, and the pentadactyl limbs with all digits clawed place *Opipeuter* in Group II of the Teiidae. The combination of smooth body scales and the large, nearly circular, undivided, transparent disc in the lower eyelid, distinguish *Opipeuter* from all other genera in Group II. In addition, I have examined hemipenes of about 20 genera and 50 species of this group of the family; the arrangement in *Opipeuter* is distinctive.

DERIVATION OF NAME. The name *Opipeuter* (masculine) is from the Greek ὀπίπευτήρ, a gazer, in reference to the large transparent disc in the lower eyelid.

Opipeuter xestus, new species (Fig. 1)

HOLOTYPE. UMMZ 128835, an adult male collected in March, 1929, by F. B. Steinbach at Incachaca, Cochabamba, Bolivia, about 2200 m above sea level.

PARATOPOTYPES. UMMZ 69555 (4 specimens), 69559 (22), BMNH 1931.2.2.1-6, YPM 6575-6, F. B. Steinbach, March 1929; AMNH 38957-62, MCZ 49577, José Steinbach, 1920.

REFERRED MATERIAL. Bolivia, Cochabamba, Yungas de Cochabamba: UMMZ 69556 (7), BMNH 1931.2.2.7; Locotal (1600 m): UMMZ 69557; Paracti (1900 m): UMMZ 69558 (3); Yungas del Palmar: ZSM 5/1940; Monte Punco (3000 m): ZSM 5/1940; Bolivia: AMNH 22740-41; South America: USNM 59013.

Some of the localities listed above for typical material differ from the original catalog entries for them. The holotype and the paratypes, with the exceptions of AMNH 38957-62 and MCZ 49577 (*ex* AMNH 38956), were originally listed as Tucachaca. Charles F. Walker has informed me that the original label covering all of these specimens was incorrectly transcribed at the University of Michigan; evidence supporting this view has been patiently assembled by Mario Baudin; similarly, the specimens listed from Locotal were originally cataloged as from Sucotal, while those from Paracti were cataloged as from Toracti. BMNH 1931.2.2.7, while cataloged as from Yungas de Achabamba, was received from the University of Michigan Museum of Zoology, and was one of a series with similar data; I have therefore emended the locality to Yungas de Cochabamba.

DEFINITION. Distinguished by characters of the genus.

DESCRIPTION OF HOLOTYPE. Rostral in contact with first supralabial, nasal, and frontonasal. Frontonasal as wide as long. Two prefrontals forming short median suture. Frontal 1.5 times as long as broad. Paired frontoparietals in contact medially. Interparietal 1.75 times as long as broad, with parallel lateral margins. Parietals approximately as long as wide, each in contact medially with interparietal, anteriorly with frontoparietal, third supraocular, fifth superciliary, two temporal scales, and paramedian occipital scale. Nasal divided posterior to nostral, suture touching frontonasal

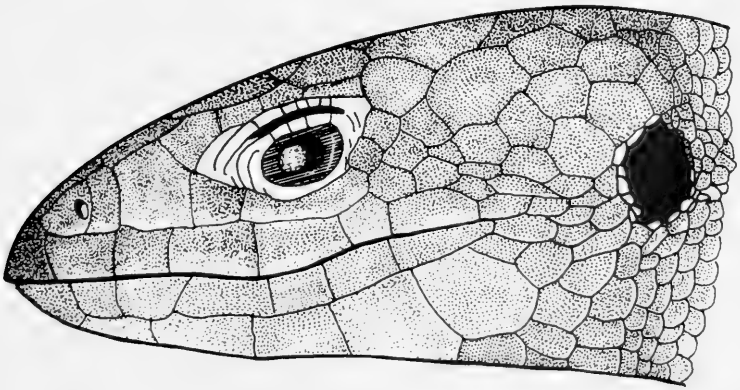


FIG. 1. Lateral head scales of the holotype (UMMZ 128835) of *Opipeuter xestus*, new species (× 8).

and first supralabial. Loreal touching prefrontal, second supralabial, and part of third. Beneath eye, a short frenoocular above third supralabial, and a long subocular touching third, fourth, and fifth supralabials. Six supralabials on each side; three supraoculars, first largest, third intermediate, second smallest; contact between first and third separating second from superciliary series on both sides. Superciliary series complete; large first superciliary expanded onto dorsal surface of head; three smaller scales adjacent to supraoculars; an enlarged fifth superciliary scale at hind margin of eye. Temporal scales flat, polygonal. Median occipital and paramedian occipital scales present. Disc in lower eyelid relatively large, occupying about ¾ diameter of eye itself. Ear opening taller than wide, about size of disc in lower eyelid; tympanum recessed within external auditory meatus. Mental followed by one unpaired chinshield 1.5 times as wide as long, and by four paired chinshields; first three chinshields in contact medially. The pregular scales (Ruibal 1952) smooth, polygonal, in irregular rows; anterior gulars small, roughly quadrilateral, with rounded posterior margins; posterior gulars larger with approximately same shape; gulars forming 8 rows anterior to collar; collar of 10 scales, rather larger than posterior gulars, largest scales median, all with rounded posterior edges.

Dorsal body scales smooth; on neck, wider than long, posteriorly, longer than wide; sides of dorsals subparallel except for med.an row; posterior margins rounded. Lateral scales smaller than dorsals or ventrals, forming wide band between them; laterals of same shape as dorsals, smooth, with rounded posterior margins. Ventral scales smooth, longer than wide anteriorly, wider than long at midbody, longer than wide posteriorly; edges subparallel, posterior margins rounded. Two large scales in anterior row of preanals, four large median and two minute lateral scales in posterior row; median preanals narrow, widening slightly from anterior to posterior; larger lateral posterior preanal scales almost as wide as long. Femoral pore series separated from preanal area by small scales; posterodistal edge of each femoral pore bounded by small scale. Scales on forelimb smooth; anteriorly and dorsally, larger; beneath, granular; subdigital lamellae simple, not divided; scales of palm granular; scales along margin between thumb and wrist not conspicuously enlarged. Scales of hind limb smooth; thigh with large rounded scales anteriorly, small granules posteriorly; shank

with large rounded scales anteriorly and ventrally, with smaller scales dorsally; subdigital lamellae simple, divided, the separate parts not forming tubercles; scales of sole granular. Claws relatively robust. On tail, scales with essentially same shape above as dorsal scales; laterally, with similar shape but narrower; two median ventral rows somewhat wider than lateral rows adjacent to them.

Color and pattern obscure; a light line on two mid-dorsal rows bordered on either side by darker area; a thin, white line encircling tympanum, continuing posteriorly to collar, where broken, and on to above the arm insertion; ground color above dark gray drab; below light; each ventral scale with gray-black mark occupying most of scale area; steel gray area of mid- and posterior ventral scales surrounded by white borders and with melanin in them more diffuse; under surface of tail light; rest of tail dark except for suggestion of light line dorsally.

Snout to vent length 44 mm; tail tip regenerated; hind leg length 18 mm.

VARIATION. Most of the variation observed is given in Table 1. All but one of the specimens have 3-3 supraoculars; the exception has two supraoculars on the left; two individuals have an additional granule present on each side. Thirty-one individuals have the second supraocular on both sides excluded from the superciliary series by contact between the first and third supraoculars; 9 additional specimens have the second supraocular so excluded on one side. All but two specimens have a distinct median occipital; in one, the median occipital has a short longitudinal groove in its anterior end; another has two small scales, apparently representing a longitudinally divided median occipital. A loreal is present on all but one side of one individual; in this animal, a short vertical groove begins at the supralabials and indicates the outline of a loreal. The single loreal touches both frontonasal and supralabials in most individuals. In one, the loreal is divided into upper and lower scales on both sides; in six, it is divided on one side only; two additional individuals have one loreal semi-divided. Four individuals were recorded as having 10 longitudinal rows of ventral scales; the others were recorded as having 8 such rows, but at least 12 of these could have been recorded as 9 or 10. All but one of the specimens examined has the nasal divided on both sides; the

exception has a groove ¾ of the way across the nasal beginning at the dorsal margin. The pattern of the division in the nasal varies considerably. Usually there is a groove vertically behind the nostril from the frontonasal to the first supralabial. In many individuals the dorsal end of the groove is shifted posteriorly along the dorsal margin of the nasal, or even down the posterior margin

TABLE 1. Variation in certain characters of *Opipeuter xestus*. Figures are ranges and (in parentheses) means.

Locality	Dorsal Scale Rows	Scales Around Midbody Region	Subdigital Lamellae 4th toes	Subdigital Lamellae 4th fingers	Total Femoral Pores	Transverse Rows of Ventrals
Incachaca						
24 ♂♂	34-43	28-34	21-26[1]	16-20[2]	15-20	22-26
	(39.0)	(30.7)	(23.8)	(17.8)	(17.1)	(24.4)
18 ♀♀	38-42	27-34[3]	20-26[4]	16-20[5]	0-16	23-27
	(39.9)	(30.7)	(23.2)	(18.0)	(3.0)	(25.2)
Cochabamba						
4 ♂♂	36-41	32-35	23-26[6]	17-19	16-18	24-26
	(38.0)	(33.0)	(24.0)	(17.9)	(16.7)	(25.3)
4 ♀♀	39-41	29-35	21-24	15-19	0-17	24-27
	(40.0)	(31.0)	(22.5)	(17.4)	(7.8)	(25.5)
Paracti						
2 ♂♂	39-40	33-34	24[7]	16-18[7]	18-20	23-24
1 ♀	45	32	20-21	17-18	3	27
Locotal						
1 ♂	37	33	24	17-19	16	23
Monte Punco						
1 ♂	45	25	20-21	16-17	12	28
Palmar						
1 ♀	40	29	22-23	17	2	25
Miscellaneous						
1 ♂	35	30	22	17	18	26
2 ♀♀	38-40	30-33	20-22	14-16	2-20	26-27

[1]45 digits; [2]46 digits; [3]17 females; [4]31 digits; [5]34 digits; [6]7 digits; [7]2 digits.

of the nasal so that only the posteroventral corner of the nasal shield is cut off. The long subocular is present in most individuals; in one it is divided on one side. This scale, together with the frenoocular, forms the complete lower margin of the eye opening. Usually the posterior end of the subocular lies over the fifth supralabial. Due to fusion or subdivision of labial scales, it may end over a fourth supralabial (1 side) or a sixth (3 sides).

The greatest variation noted was in coloration. In UMMZ 69558, in 6 specimens of UMMZ 69556, and in BMNH 1931.2.2.7, the general appearance of the lizard is much lighter than in the holotype or paratypes. This appears to be due to a reduced areal extent of the dark pigments, and a covering of them by a whitish pigment. The result is that the dark brown border of the grayish dorsal light line makes much greater contrast both with the light line and with the dull tan ground color lateral to the border, rather than getting lost in the generally dark dorsal color. The light line encircling the ear opening and continuing posteriorly along the side is wider and bordered above and below by dark brown. The venter is generally light, although many specimens show grayish spots caused by the blackish pigment showing through the whitish pigment that lies over it. It is highly probable that this variation is due to preservation of the darker individuals in formalin, the lighter ones in ethanol.

The largest male examined was 51 mm snout to vent; the largest female, 58 mm. Eight males 31 to 44 mm snout to vent with tail intact had tail over snout-vent length ratios of 1.8 to 2.0, mean 1.92; 4 females 46 to 50 mm snout to vent had ratios of 1.6 to 1.7, mean 1.67. Hind leg over snout-vent length ratios varied from 0.41 to 0.46 for small males (26 to 35 mm snout to vent), from 0.41 to 0.47 for longer ones (36 to 51 mm snout to vent). For females 42 to 55 mm snout to vent, this ratio varied from 0.38 to 0.43.

SEXUAL DIMORPHISM. The most conspicuous sexual dimorphism is in femoral pore number (Table 1). Although occasional females have pore counts of 13, 15, 17, or even 20, the great majority have 0, 2, or 4. In all females, however, the pores that are present are distal on the thigh rather than proximal; when the number in the series matches that found in males, the pore series reaches the proximal end of the thigh. There is variation in the number

of preanal scales. Sixteen males were recorded as having 4 posterior preanal plates; one has 3, another 3 and 2 very small lateral scales. Thirteen have 4 large posterior preanals, plus 2 minute lateral slivers. One male has 5 posterior preanals, another 6; in these two, the outermost scale on each side is thin. Among the females, in contrast, counts of 6 were recorded for 15 individuals, although the outermost scales on each side in these is narrow. Eight other females have 4 posterior preanals plus a minute additional scale on each side. One count of 4 and two of 5 were also recorded.

HEMIPENIS OF OPIPEUTER XESTUS. The left hemipenis of one male from UMMZ 69559 was removed, washed overnight in distilled water, stained in a solution of alizarin red S in 0.5 percent KOH, and destained in distilled water. In order to insure rapid penetration of the dye, the hemipenis was slit along the sulcus spermaticus. After destaining, the hemipenis was completely opened on the ventral side by enlarging the slit in the sulcus. Photographs of various features are shown in Figs. 2 and 3.

It was possible to open the hemipenis for approximately half of its total length; the remaining part is largely made up of retractor muscle, and is not shown in Fig. 2. Within the basal half, there are two sets of flounces each with numerous members; each flounce contains numerous fine, calcareous spinules. These flounces form chevron-shaped folds in the inverted hemipenis, with the free ends on the median welt dorsally and adjacent to the sulcus spermaticus ventrally. The apices of the chevrons are basal. In the unopened and inverted hemipenis, each lateral flounce begins on the ventral side near the sulcus spermaticus, spirals diagonally toward the base around the lateral side of the space within the inverted hemipenis to form an angle dorsal to the lateral free edge of the median welt, after which each spirals distally around the lateral free edge of the dorsally placed median welt and end on its ventral side; each median flounce follows an essentially mirror-image

FIG. 2. Structure of the left hemipenis of *Opipeuter xestus* (UMMZ 69559). The inverted organ has been slit along the sulcus spermaticus. A. The basal part, showing general arrangement of flounces in the lateral (left) and medial (right) pockets, and locations of groups of enlarged teeth (× 17). B. Enlarged teeth on lateral wall of sulcus spermaticus (× 29). C. Enlarged teeth at base of median welt (× 29).


B
C
A

FIG. 3. Details of flounces and minute spines in the medial pocket of inverted left hemipenis of *Opipeuter xestus* (UMMZ 69559). The median welt has been folded back to show the apices of the chevron-shaped flounces (× 27).

course. When the hemipenis is slit and laid open along the ventral, sulcus-bearing side, the two sets of flounces line two distinct pockets. There are 21 medial and 19 lateral folds in the medial pocket (Fig. 3), and 15 medial and 19 lateral folds in the lateral pocket.

The spines do not continue across the apex of the flounce, although the flounces are continuous.

Basally, on the median welt, there are a series of enlarged spines. These form three rows, the most basal (scarcely visible in Fig. 2C) with four teeth, the middle with seven teeth, and the most distal (uppermost in Fig. 2C) with eight teeth.

On each side of the sulcus spermaticus there is a row of enlarged spines (Fig. 2A, B). There are three spines along the lateral edge of the sulcus, five along the medial edge.

The most common arrangement of the flounces in the hemipenes of lizards of Group II of the Teiidae is a series of chevrons. Variation occurs in their continuity across the apices, across the median welt, in their number and in the number of spinules in them. Enlarged spines may occur at a variety of positions, either in the flounces or in separated groups. The groups of enlarged spines along the sulcus in combination with a group at the base of the median welt has not been observed outside of *Opipeuter*. A survey of these structures in Group II of the Teiidae is in preparation.

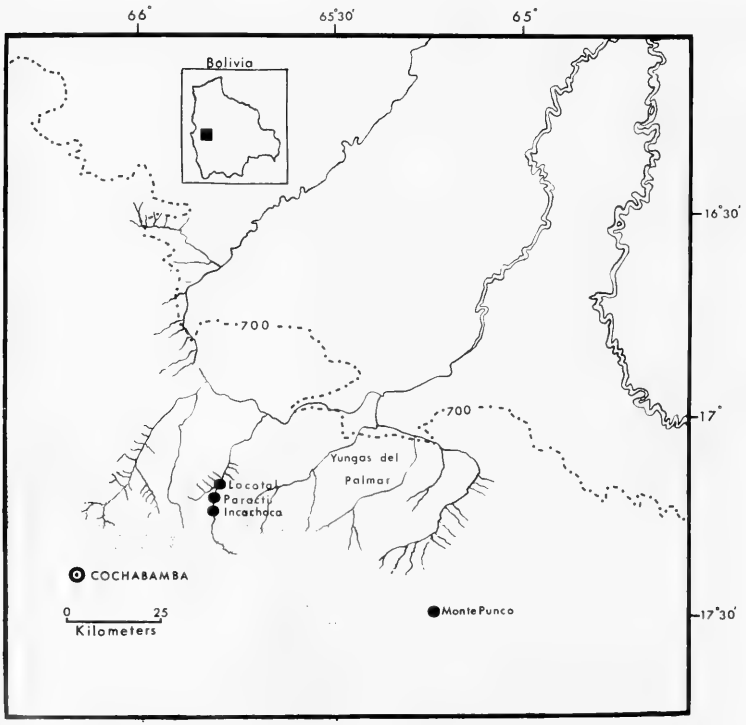
BIOLOGY. Nothing is known of the habits of *Opipeuter xestus*. Two leathery eggs, one in each oviduct, are present in each of three females; in all three, the right egg is located more anteriorly. Two other females each contain a single leathery egg, in both cases in the right oviduct.

The enlarged transparent eye disc represents an extreme expression of a widespread altitudinal and latitudinal gradient in teiid lizards of Group II. Northern populations, whether representing local populations of widespread species, restricted species, or even restricted genera, have the disc in the lower eyelid divided by vertical grooves into two to many segments. Usually when the disc is divided, the lens is translucent, although often, especially in populations from higher altitudes, the disc contains black pigment to varying degrees. Southern populations tend to have the disc an oval, undivided, translucent scale. *Opipeuter xestus,* with

its large, almost circular, transparent, undivided disc, is extreme. The extent to which the eye is kept open or closed in life is not known, but the great specialization suggests that the lid must be closed most of the time.

RANGE. All of the specimens of *Opipeuter xestus* with detailed data were collected on the eastern Andean slopes of central Bolivia (map). Altitudes associated with the localities vary from 1600 to 3000 m above sea level.

DERIVATION OF NAME. The name *xestus* is derived from the Greek word for smooth, ξεστος.



Collection localities for *Opipeuter xestus* on the eastern Andean slopes of central Bolivia. Dotted line indicates 700 m; areas above 3500 m are shaded.

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