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A NEW SALAMANDER (GENUS *OEDIPINA*) OF THE *UNIFORMIS* GROUP FROM WESTERN PANAMA

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Editor

A NEW SALAMANDER (GENUS *OEDIPINA*) OF THE *UNIFORMIS* GROUP FROM WESTERN PANAMÁ

By ARDEN H. BRAME, JR.[1] AND WILLIAM E. DUELLMAN[2]

ABSTRACT: A new species of *Oedipina* from western Panamá is described from the montane cloud forest on the northern slopes of Cerro Pando. In many characters this long-bodied *Oedipina* falls in an intermediate position between the *uniformis* and *collaris* subgroups of the *uniformis* group and its closest relative appears to be *Oedipina cyclocauda*. Because it has similar coloration of a brown trunk dorsum and white to yellow or silvery lateral stripes as in *O. collaris*, *O. poelzi*, and *O. altura* (members of the *collaris subgroup*), it is placed within that subgroup.

An expedition conducted by Duellman, Charles W. Myers and Linda Trueb in May, 1966 to the north slopes of Cerro Pando resulted in the discovery of an extraordinarily rich salamander fauna including three undescribed species of *Bolitoglossa* plus *B. subpalmata* and *B. marmorea*. In addition, a large species of *Oedipina* was discovered; it represents the seventh species of the genus known to occur in Panamá, the other six being *Oedipina alfaroi*, *O. collaris*, *O. complex*, *O. cyclocauda*, *O. parvipes* and *O. uniformis* (see Brame, 1968 for a recent review). In allusion to its large size (only *O. collaris* attain a longer standard length) we propose that it be called:

Oedipina grandis, new species

Figures 1–3; Tables 1 and 2

Holotype. KU 116676, an adult male from the northern slopes of Cerro Pando, between 1810 and 1930 m elevation (5937-6330 feet), Provincia de Bocas del Toro, extreme western Panamá near the border with Costa Rica; obtained by Charles W. Myers, on May 14, 1966.

Paratypes. LACM 57055 and 57056, topoparatypes; KU 116673, 1930 m (6330 feet), KU 116674, 1950 m (6396 feet); KU 116678, 1920 m (6298 feet) and KU 116679, 1810 m (5904 feet); all from the northern slopes of Cerro Pando, Provincia de Bocas del Toro; collected by Charles W. Myers, William E. Duellman and Linda Trueb, May 11–30, 1966.

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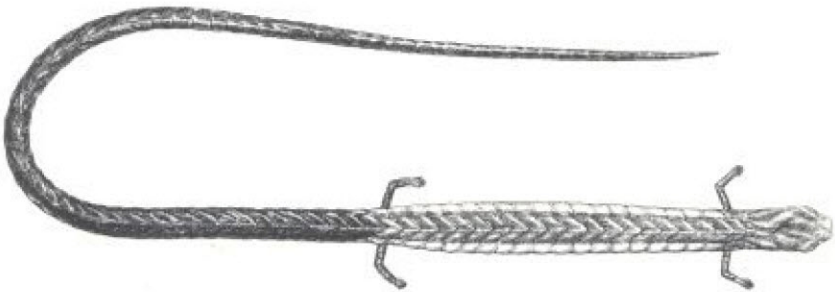

FIGURE 1. Dorsal view of *Oedipina grandis*, holotype, KU 116676, an adult male. Total length equals 214.9 mm.

Diagnosis. A member of the *Oedipina collaris* subgroup of the *uniformis* group but in some ways intermediate between the *collaris* and *uniformis* subgroups (see section on evolutionary relationships). The second largest species of *Oedipina;* standard lengths of 7 adults range from 55.1 to 71.4 (mean 65.1 mm). Distinguished from all members of the *collaris* subgroup (*O. collaris, O. poelzi, O. altura, O. pseudouniformis* and *O. cyclocauda)* by having proportionally narrower heads, shorter limbs and smaller feet. *Oedipina grandis* is similar to *O. poelzi*, some *O. collaris* and *O. altura* in having a color consisting of dark to medium brown back and head, trunk bordered by silvery to cream to yellow light dorsolateral stripes boldly demarcated from the deep black ventral coloration and black dorsum of tail (Figs. 1 and 2). (See section on comparison and Table 2 for proportional character differences between *Oedipina grandis* and the other members of the *collaris* subgroup plus *Oedipina stuarti* of the *uniformis* subgroup.)

Description of holotype. Adult male, snout short and gently rounded at tip; mental hedonic gland not evident externally, nostril small, labial protuberances small, canthus rostralis moderately arched. Standard length 11.1 times head width and 7.1 times snout-gular fold length (head length). Vomerine teeth 9 left, 9 right, extending to posterior lateral border of the internal nares. Maxillary teeth 24 left, 25 right, extending posteriorly to a point two-thirds distance through length of orbit. Two premaxillary teeth, both protruding through upper lip. Postorbital groove distinct, extending for 3.3 mm posteriorly from eye as moderate depression, abruptly proceeding ventrally and extending across gular area (as the nuchal groove) parallel to and 2.2 mm anterior to gular fold. Tail thick, nearly round at base but slightly compressed laterally for last half of length with constriction at base barely

evident; 2.21 times standard length. Postiliac glands large, round and prominent. Limbs moderately short, 12 costal folds remaining uncovered when limbs appressed to sides of trunk; standard length 9.1 times right fore limb, 8.4 times right hind limb, 34.5 times right foot width. Fingers and toes fairly thickened, inner and outer toes I and V fused to II and IV respectively; rest of toes extensively webbed with but the terminal one to one and one-half phalanges free. Fingers in order of decreasing length: 3, 2, 4, 1; toes in order of decreasing length: 3, 2, 4, 5, 1.

Measurements (in mm). Head width, 5.9; snout-gular fold (head length), 9.3; head depth at posterior angle of jaw, 3.1; eyelid length, 2.4; eyelid width, 1.5; anterior rim of orbit to snout, 2.9; anterior rim of orbit to external nares, 1.8; horizontal orbital diameter, 1.4; interorbital distance, 2.5; distance between vomerine teeth and parasphenoid tooth patches, 0.6; distance between vomerine teeth and premaxillary teeth, 2.2; internal choanae (nares) to premaxillary teeth, 2.0; distance separating external nares, 2.1; distance separating internal nares, 1.8; snout to fore limb, 15.6; snout projection beyond mandible, 0.8; snout to posterior angle of vent (standard length), 65.6; snout to anterior angle of vent, 61.8; axilla-groin length, 43.9; fore limb length, 7.2; hind limb length, 7.8; width of right hand, 1.6; width of right foot, 1.9; tail length, 145.3; tail depth at base, 3.9; tail width at base, 3.8.

Color in life. Dorsum dark brown with minute silver flecks, especially on head and limbs, and small irregular dark (black) marks on dorsum; chin pale brown with silver flecks; belly, lower flanks and ventral surfaces of tail black with or without silver flecks. Iris (under magnification) dark brown with small light brown flecks.

Color (in 70% ETOH). Color much faded from that of living specimen; dorsum of trunk brown bordered by silvery whitish dorsolateral stripes of uneven borders markedly set off from intense black venter and intense black tail color. Limbs with some brown spots on black background above; gular area gray and rest of ventral surfaces black.

Variation. Males have proportionally longer legs (standard length/hind leg length equals 8.1-8.7, mean 8.4, for males; 8.9-10.1, mean 9.3, for females) and proportionally larger feet (standard length/right hind foot equals 34.5-45.9, mean 39.3, for males; 38.3-47.0, mean 42.0, for females). Males, as usual for bolitoglossines, are smaller than females; males range from 55.1-67.6 (mean 62.8 mm), compared to 61.2-71.4 (mean 66.9 mm) for females. The holotype has a somewhat larger foot than the other specimens and KU 116674, another male, has the broadest head and longest legs proportionally (see Table 1). Other than the above mentioned differences and the usual sexually dimorphic characters (males with papillate vents and premaxillary teeth protruding through upper lip), the paratypes and type agree closely (see Table 1). The color is much the same for all specimens although the dorsolateral white-silverish to yellow stripes are broader and more distinct in most paratypes than for the holotype (see Figs. 1 and 2).

FIGURE 2. Dorsolateral view of *Oedipina grandis*, paratype, KU 116674, an adult male measuring 55.1 mm standard length and 154.1 mm total length. Photograph by Charles W. Myers.

Comparison. *Oedipina grandis* is the second largest species of the genus, 7 adults ranging from 55.1 to 71.4 (mean 65.1 mm); related to *poelzi, altura, pseudouniformis* and *cyclocauda* (these occurring in various parts of Honduras, Nicaragua, Costa Rica and Panamá [see Brame, 1968]). Distinguished from these four species by its larger size, 55.1-71.4 (mean 65.1 mm) standard lengths, compared to 45.1-63.6 (mean 55.6 mm) for 29 *poelzi*, 57.7 mm for one *altura*, 39.3-59.9 (mean 45.3 mm) for 23 *pseudouniformis*, and 36.4-44.1 (mean 41.5 mm) for 20 *cyclocauda*. Distinguished from *Oedipina poelzi* of Costa Rica by having a much narrower head, standard lengths 10.0-11.7 (mean 11.2) times head widths versus 5.1-6.7 (mean 6.1) for 29 *poelzi*; much smaller feet, standard lengths 34.5-47.0 (mean 40.9) times right foot widths in contrast to 25.0-28.9 (mean 26.5) for 5 *poelzi*; and fewer vomerine teeth, mean standard length 3.43 times mean vomerine tooth numbers versus 2.42 times in *poelzi*. Distinguished from *altura* of Costa Rica by having a short rounded snout, shorter legs, standard lengths 8.1-10.1 (mean 8.9) times right hind limb length compared to 8.2 in the single adult *altura*, smaller feet, standard lengths 34.5-47.0 (mean 40.9) times right hind foot widths versus 32.1 in *altura*, and larger numbers of maxillary teeth 38-60 (mean 49) in contrast to 27 in *altura*. Distinguished from *Oedipina pseudouniformis* of Nicaragua and Costa Rica by having a considerably narrower head, standard lengths 10.0-11.7 (mean 11.2) times head widths compared to 8.7-9.7 (mean 9.3) for 23 *pseudouniformis*, shorter limbs, standard lengths 8.1-10.1 (mean 8.9) times right hind limb lengths versus 6.5-8.1 (mean 7.4) for 23 *pseudouniformis*, smaller feet, standard lengths 34.5-47.0 (mean 40.9) times right foot widths in contrast to 30.2-32.1 (mean 31.4) for *pseudouniformis*, and fewer vomerine teeth, 16-23 (mean 19) compared to 17-34 (mean 25) for *pseudouniformis*, a smaller species, mean standard length times mean vomerine teeth

for *grandis* 3.43, for *pseudouniformis* 1.81. Distinguished from the small sized *Oedipina cyclocauda* of Honduras, Nicaragua, Costa Rica and Panamá by having proportionally narrower heads, standard lengths 10.0-11.7 (mean 11.2) times head width in contrast to 9.1-11.3 (mean 9.9) for 20 *cyclocauda*, shorter legs, standard lengths 8.1-10.1 (mean 8.9) times right hind limb versus 7.2-9.0 (mean 8.2) in 20 *cyclocauda*, by having smaller feet, standard lengths 34.5-47.0 (mean 40.9) times right hind foot widths in contrast to 29.0-36.7 for *cyclocauda*, and similar numbers of vomerine teeth 16-23 (mean 19) in *grandis* compared to 16-23 (mean 18) in *cyclocauda*, a much smaller species, mean standard length times mean vomerine teeth for *grandis* 3.43 versus 2.31 for *cyclocauda*.

The similarities in body proportions between *grandis* and *stuarti* (from Honduras) are probably due to convergence; proportions of limb length and numbers of maxillary teeth and vomerine teeth are similar (Table 2) but comparisons of head width, [standard lengths 10.7-11.7 (mean 11.2) times head widths versus 11.1-12.3 (mean 11.7)] reveal that *grandis* has a proportionately broader head, and comparisons of the feet [standard lengths 34.5-47.0 (mean 40.9) times right foot widths in contrast to 30.6-30.8 for *stuarti*] show that *grandis* has smaller feet. In addition, *stuarti* is uniform lead-black on all surfaces in sharp contrast to *grandis*, which has a brown back, white or silver to yellow sides and deep black venter.

Habitat. All specimens were obtained in undisturbed montane cloud forest (see Myers, 1969, for detailed description). The area between 1800 and 1950 meters on the northern slope of Cerro Pando is characterized by a broad-leafed evergreen forest with a canopy about 20 meters above the ground. The relatively open forest supports an understory of palms and tree ferns. Thick growths of mosses occur on trees and logs. The leaf litter is thick and, at least throughout May, 1966, continuously wet (see Fig. 3).

Five specimens were found beneath decaying logs on the forest floor and one was beneath rotting thatch from a former shelter. One individual was found as it was crawling on the ground in the camp clearing at night.

Range. Known only from the type locality and vicinity from between 1810 to 1950 meters (5937-6396 feet) elevation, on the northern slopes of Cerro Pando, Provincia de Bocas del Toro, extreme western Panamá, near the border with Costa Rica.

Evolutionary relationships. In many characters *Oedipina grandis* is intermediate between the *uniformis* subgroup (*uniformis, paucidentata, stuarti, ignea, alfaroi* and *taylori*) and the *collaris* subgroup (*collaris, poelzi, altura, pseudouniformis* and *cyclocauda*). These two subgroups compose the *uniformis* group. In head width and hind limb length, *Oedipina grandis* is intermediate between the bulk of the species in the two subgroups. Except for having tiny feet as in *uniformis, grandis* seems to be more closely related to the lowland *Oedipina cyclocauda* of the Caribbean slopes of Honduras, Nicaragua, Costa Rica and northwestern Panamá than to any other species.

FIGURE 3. Montane cloud forest habitat of *Oedipina grandis*, northern slope of Cerro Pando, 1950 meters (6396 feet) elevation, Provincia de Bocas del Toro, Panamá. Paratype, KU 116674, of *Oedipina grandis* was found under the log with hat on it in lower right. Photograph by Charles W. Myers, May 12, 1966.

Oedipina grandis should be placed on the dendogram (Brame, 1968: 58, Fig. 29) towards *cyclocauda* in an intermediate position between the two subgroups. Its dorsal and dorsolateral coloration is remarkably similar to *poelzi, altura* and some *collaris*, which have brown backs bordered by white-silverish to yellow dorsolateral stripes set off from the deep black ventral coloration, an additional reason for aligning *grandis* with the *collaris* subgroup. Thus, *grandis* is the most specialized member of this subgroup; it has a proportionately larger head and limbs but smaller feet, thereby approaching members of the *uniformis* subgroup. Therefore, it seems that *grandis* might be better adapted to a fossorial existence than other members of the *collaris* subgroup. The slight tendency in reduction in number of maxillary teeth and moderate tendency in reduction in number of vomerine teeth are indications of trends in specializations similar to those in *altura, stuarti, paucidentata, ignea, taylori* and *alfaroi;* possibly reduction in number of teeth is associated with a different diet from that of the multidentate species, a factor probably further influenced by their more fossorial habits. This description increases the total to 12 species inhabiting the region of suspected origin for the genus *Oedipina* in Costa Rica and western Panamá (Brame, 1968: 56), and increases the total number of known species of *Oedipina* to 16.

TABLE 1. Meristic data for specimens of *Oedipina grandis*

Museum Number	Sex	Snout-Vent Length	Axilla-Groin Length	Head Width	Hind Limb Length	Fore Limb Length	Costal Folds between Appressed Limbs	Right Foot Widths	Maxillary Teeth	Vomerine Teeth	Tail Length	Snout-Gular Fold Length
KU 116673	♂	67.6	47.3	5.8	7.8	7.3	13	1.8	58	22	——**	10.2
KU 116676*	♂	65.6	43.9	5.9	7.8	7.2	12	1.9	49	18	145.3	9.3
KU 116674	♂	55.1	37.2	5.5	6.8	5.8	12½	1.2	41	17	99.0	8.9
LACM 57056	♀	71.4	50.2	6.3	7.1	7.1	13	1.8	52	23	122.3	9.8
KU 116679	♀	70.5	49.8	6.2	7.8	7.2	13	1.5	60	18	94.1**	9.8
KU 116678	♀	64.5	44.2	5.6	7.0	6.1	12½	1.5	46	22	121.7	8.5
LACM 57055	♀	61.2	43.3	5.5	6.9	6.2	13	1.6	38	16	130.8	8.1

* = Holotype ** = Regenerated tails

TABLE 2. Proportional measurements and data for *Oedipina grandis* and its relatives

Species	Standard Length		Standard Length / Head Width		Standard Length / Hind Limb Length		Standard Length / Foot Width	
O. grandis	**7**	55.1-71.4 (65.1)	**7**	10.0-11.7 (11.2)	**7**	8.1-10.1 (8.9)	**7**	34.5-47.0 (40.9)
O. poelzi	**29**	45.1-63.6 (55.6)	**29**	5.1- 6.7 (6.1)	**29**	6.7-10.0 (8.4)	**5**	25.0-28.9 (26.5)
O. pseudouniformis	**23**	39.3-59.9 (45.3)	**23**	8.7- 9.7 (9.3)	**23**	6.4- 8.1 (7.4)	**4**	30.2-32.1 (31.4)
O. altura	**1**	57.7	**1**	10.7	**1**	8.2	**1**	32.1
O. cyclocauda	**20**	36.4-44.1 (41.5)	**20**	9.1-11.3 (9.9)	**20**	7.2- 9.0 (8.2)		29.0-36.7
O. stuarti	**3**	54.1-61.1 (57.9)	**3**	11.1-12.3 (11.7)	**3**	8.7- 9.5 (9.1)	**3**	30.6-30.8 (30.7)

Species	Maxillary Teeth		Vomerine Teeth		Intercostal Folds Covered by Appressed Limbs	
O. grandis	**7**	38-60 (49)	**7**	16-23 (19)	**7**	12 -13 (12.7)
O. poelzi	**29**	42-70 (53)	**33**	14-34 (23)	**33**	9 -11.5 (10.1)
O. pseudouniformis	**23**	36-57 (45)	**22**	17-34 (25)	**23**	9 -12.5 (11.3)
O. altura	**1**	27	**1**	17	**1**	13
O. cyclocauda	**20**	28-47 (36)	**20**	16-23 (18)	**20**	11 -12.5 (11.7)
O. stuarti	**3**	43-44 (43)	**2**	17-18 (18)	**3**	12.5-13 (12.7)

Boldface numbers = number of specimens Numbers in parentheses = means

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RESUMEN

Una especie nueva de *Oedipina* de la región occidental de Panamá se descrita del bosque nublado montaño en la ladera norte de Cerro Pando. Debido a muchas de sus características esta *Oedipina* de cuerpo largo ocupa una posición intermedia entre los subgrupos *uniformis* y *collaris* en el grupo *uniformis* y parece estar muy relacionada a *Oedipina cyclocauda*. Por su coloración similar morena en el dorsum del tronco y blanca, amarilla o plateada en las bandas laterales como en *O. collaris*, *O. poelzi* y *O. altura* (miembros del subgrupo *collaris*), esta especie es incluida en ese subgroupo.

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