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

By Arden H. Brame, Jr. and William E. Duellman
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VIRGINIA D. MILLER
Editor
A NEW SALAMANDER (GENUS OEDIPINA)
OF THE UNIFORMIS GROUP FROM WESTERN PANAMÁ

By Arden H. Brame, Jr.¹ and William E. Duellman²

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 simi-
lar coloration of a brown trunk dorsum and white to yellow or
silvery lateral stripes as in O. collaris, O. poelzi, and O. alta (m)
(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 un-
described species of Bolitoglossa plus B. subpalmata and B. marmorata. 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
alfari, O. collaris, O. complex, O. cyclocauda, O. parvipes and O. uniformis
(see Bráme, 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,

¹Section of Herpetology (currently Research Associate), Los Angeles County Museum of Natural History. Present address: Eaton Canyon Nature Center, 1750 North Altadena Drive, Pasadena, California 91107.
²Curator, Division of Herpetology, Museum of Natural History, and Department of Systematics and Ecology, University of Kansas, Lawrence, Kansas 66044.
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. alta, 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. alta 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 parabaphenoid 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).
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-leaved 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, alfaro 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 *cycloucauda* 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*

<table>
<thead>
<tr>
<th>Museum Number</th>
<th>Sex</th>
<th>Snout-vent Length</th>
<th>Axilla-Groin Length</th>
<th>Head Width</th>
<th>Hind Limb Length</th>
<th>Fore Limb Length</th>
<th>Costal Folds between Appressed Limbs</th>
<th>Right Foot Width</th>
<th>Maxillary Teeth</th>
<th>Vomerine Teeth</th>
<th>Tail Length</th>
<th>Snout-Gular Fold Length</th>
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<tr>
<td>KU 116673</td>
<td>♀</td>
<td>67.6</td>
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<td>7.8</td>
<td>7.3</td>
<td>13</td>
<td>1.8</td>
<td>58</td>
<td>22</td>
<td>---</td>
<td>10.2</td>
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<tr>
<td>KU 116676*</td>
<td>♀</td>
<td>65.6</td>
<td>43.9</td>
<td>5.9</td>
<td>7.8</td>
<td>7.2</td>
<td>12</td>
<td>1.9</td>
<td>49</td>
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<td>5.5</td>
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<td>5.8</td>
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<td>1.2</td>
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<td>17</td>
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<td>7.1</td>
<td>13</td>
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<td>23</td>
<td>122.3</td>
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<tr>
<td>KU 116679</td>
<td>♀</td>
<td>70.5</td>
<td>49.8</td>
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<td>7.3</td>
<td>7.2</td>
<td>13</td>
<td>1.5</td>
<td>60</td>
<td>18</td>
<td>94.1**</td>
<td>9.8</td>
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<td>KU 116678</td>
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<td>44.2</td>
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<td>12 1/2</td>
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<td>43.3</td>
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<td>16</td>
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<td>8.1</td>
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* = Holotype  ** = Regenerated tails

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Standard Length</th>
<th>Standard Length</th>
<th>Standard Length</th>
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<td></td>
<td>Head Width</td>
<td>Hind Limb Length</td>
<td>Foot Width</td>
<td></td>
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<tr>
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<td>7</td>
<td>10.0-11.7 (11.2)</td>
<td>8.1-10.1 (8.9)</td>
<td>34.5-47.0 (40.9)</td>
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<td><em>O. poelzi</em></td>
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<td>5.1-6.7 (6.1)</td>
<td>6.7-10.0 (8.4)</td>
<td>25.0-28.9 (26.5)</td>
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<td>8.7-9.7 (9.3)</td>
<td>6.4-8.1 (7.4)</td>
<td>30.2-32.1 (31.4)</td>
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<td>32.1</td>
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<td>9.1-11.3 (9.9)</td>
<td>7.2-9.0 (8.2)</td>
<td>29.0-36.7</td>
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<tr>
<td><em>O. stuarti</em></td>
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<td>11.1-12.3 (11.7)</td>
<td>8.7-9.5 (9.1)</td>
<td>30.6-30.8 (30.7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species</th>
<th>Maxillary Teeth</th>
<th>Vomerine Teeth</th>
<th>Intercostal Folds Covered by Appressed Limbs</th>
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<tr>
<td><em>O. grandis</em></td>
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<td>12 -13 (12.7)</td>
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<td><em>O. poelzi</em></td>
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<td>14-34 (23)</td>
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<td>17-34 (25)</td>
<td>9 -12.5 (11.3)</td>
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<td><em>O. altura</em></td>
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<tr>
<td><em>O. cyclocauda</em></td>
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<td>16-23 (18)</td>
<td>11 -12.5 (11.7)</td>
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<td><em>O. stuarti</em></td>
<td>3</td>
<td>17-18 (18)</td>
<td>12.5-13 (12.7)</td>
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</tbody>
</table>

Boldface numbers = number of specimens  Numbers in parentheses = means
ACKNOWLEDGMENTS

We are grateful to Patricia L. Brame for the illustration of the holotype, and to John W. Wright for kindly reviewing the manuscript. The junior author gratefully acknowledges the field companionship of Drs. Charles W. Myers and Linda Trueb, who worked with him in Panamá. Field studies were supported by the National Institutes of Health (GM-12020) in cooperation with the Gorgas Memorial Laboratory in Panama City. The present research was completed under a grant from the National Science Foundation (GB-8139) to the University of Kansas.

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.

LITERATURE CITED


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