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A New *Celestus* (Sauria: Anguidae) from the Chaine de la Selle of Haiti

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Celestus macrotus is described from a high elevation area of southeastern Haiti. In general aspect it is similar to _C. stenurus_ but differs from this and other congeners in the large external auditory meatus, low number of dorsal scale strigae, asymmetry of the lateral scales, coloration, and other features. Ontogeny of scale surface ornamentation is used as an indicator of maturity. Standardization of eyelid scale nomenclature is suggested, and some comments are made on the method of eye closure in _Celestus_ and _Diploglossus_.

DURING recent field work in Haiti, we ascended by jeep the eastern slopes of the Massif de la Selle, above Fond Verrettes. In these pine woods at 1800–2000 m the anguid lizard *Wetmorena haetiana* is a common species. Among the specimens we collected was a single specimen of *Celestus* that is not referable to any of the known species of the genus. For this undescribed species, we propose the name

Celestus **macrotus**, n. sp.

Fig. 1

Holotype.—USNM 286917, from ca 15 km west (by logging roads) of Gros Cheval, northeastern slopes of Pic La Selle (=Chaine de la Selle; see Remarks), 2020 m, Dépt. de l'Ouest, Haiti, collected 18 Nov. 1984 by S. B. Hedges and R. Thomas.

Diagnosis.—A round-snouted, long-legged, small species of *Celestus* that differs from all other members of the genus in the low number of strigae (see Comparisons) on the dorsal scales (6–8), the large external auditory meatus (EAM) and highly diagonalized lateral scales (Fig. 2; Comparisons). It is further distinguished in having a dorsal pattern of fine dark longitudinal lines and small, granular scales around the ear opening.

Description.—A female, SVL 60 mm; head to margin of ear opening 12.3 mm; head width 8.7 mm (head width/head length = .71); tail autotomized, not regenerated. Rostral about 1.7 times wider than high, subpentagonal, followed by two wide, short (major axis transverse) supranasals, the left imbricating onto the right, in turn followed by two larger, wider frontonasals, left imbricating onto right; prefrontal

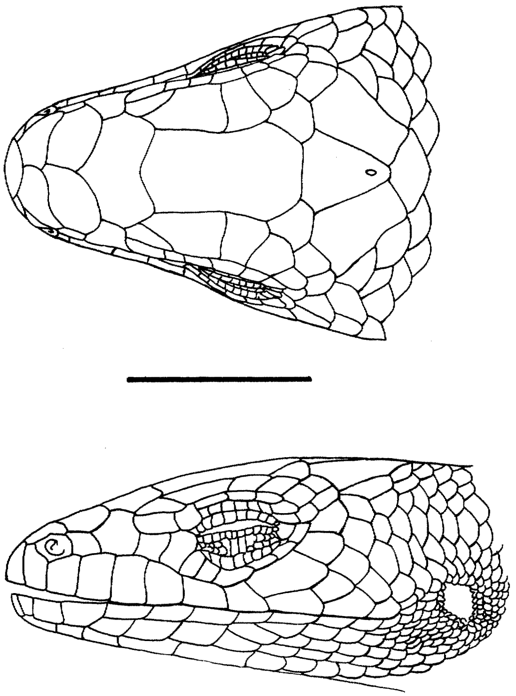

Fig. 1. Dorsal and lateral views of the head of the holotype of *Celestus macrotus* (USNM 286917).

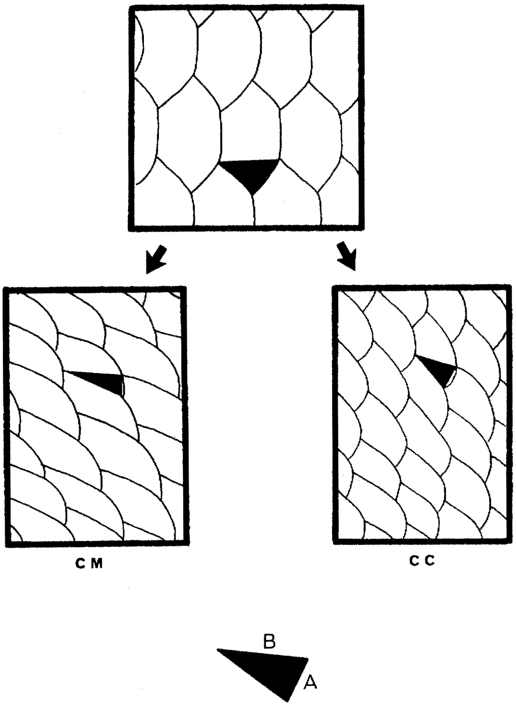

Fig. 2. Asymmetry of the lateral scales of *Celestus macrotus* (CM) and other *Celestus*, represented by *C. costatus* (CC). The upper figure shows the symmetrical dorsal scales typical of *Celestus*. Sides A and B of the black triangles indicate the measurements taken for the diagonalization ratio (=A/B).

symmetrical, emarginate posteriorly where it abuts the frontal, giving a somewhat sweptwing shape. Frontal long and narrow, about 2× as long as wide, concave on each side at margins of orbit. Frontoparietals small, triangular, at posterior corners of frontal. Interparietal nearly an isosceles triangle with base on posterior edge of the frontal, pineal opening included. Parietals on either side of interparietal subtrapezoidal, widest anteriorly. Postparietal roughly diamond-shaped, short and wide (major axis transverse). A pair of somewhat enlarged cycloid scales along lateral margins of each parietal. Arc of five temporal scales extending around orbit from frontoparietal to abut on seventh supralabial. Scales behind second arc of five temporals becoming more noticeably aligned with and more isomorphic with body scales. Nasal completely enclosing naris. First loreal small, subquadrate; second larger and extending onto canthal ridge, wedging between frontonasal and prefrontal. Large preocular at anterior canthus of eyelids. Supraoculars 5; supraciliaries 4; upper ciliaries 6; upper marginal ciliaries 11; lower marginal ciliaries 12; palisade palpebrals 20; lower palpebrals 13; suboculars 6. (See Fig. 3 and remarks for eyelid scale terminology.) Supralabials 9/11; angular subocular lying between supralabials 6 and 7 (both sides). Mental subpentagonal, nearly semicircular; postmental enlarged, subtriangular; infralabials 10/10, sublabials 4/2, genials 4/4. Ear openings large, squarish, about 1.2 mm in diameter and bordered by small granular scales; EAM with a distinct gap between outer rim and tympanic membrane. Dorsal scales with 5–8 strigae (mean of 22 scales = 6.2); dorsal scales on base of the tail with 10–13 (mean 11.2) strigae. Dorsal body scales becoming markedly asymmetrical on sides (Fig. 2) and strigae oriented diagonally back and upwards. Scales around midbody 41; scales axilla to groin in a dorsolateral series 58; ventral scales mental to vent 93. Scales of forearms smooth with slight traces of tuberculation and strigation on postaxial surface near origin of digit 5; hindlimb

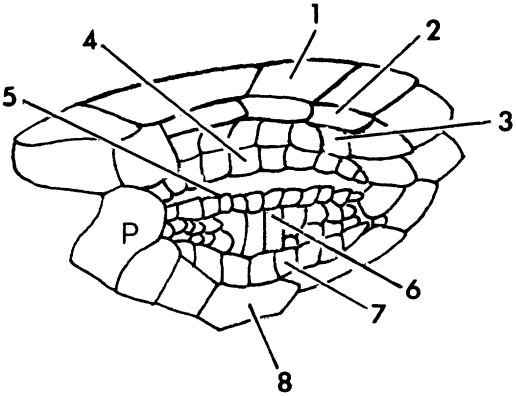

Fig. 3. Scutellation of the eyelids and adjacent regions in lateral view. 1 = supraoculars, 2 = superciliaries, 3 = upper ciliaries, 4 = upper marginal ciliaries, 5 = lower marginal ciliaries, 6 = palisade palpebrals, 7 = lower palpebrals, 8 = suboculars, P = preocular.

scales also largely smooth but with faint median keels on scales of dorsal surface of pes. Toes compressed distally; swollen lamellae to base of penultimate phalanx; total lamellae on fourth toe of pes 15; claws unsheathed. Adpressed limbs (not done) apparently meeting or overlapping slightly.

Coloration.—Ground color of dorsal zone a somewhat bronzy brown. A series of fine, dark, longitudinal dorsal lines, mostly occupying centers of scale rows, beginning just posterior to the head scales and continuing to sacral region, more interrupted or less well defined posteriorly; eight lines anteriorly, from neck to about midbody, 5–6 posteriorly. Two paramedian stripes heavier from neck to about level of forearm insertion; area between them paler than rest of dorsal ground color. Lateral zone demarcated from dorsal zone by narrow light stripe; lateral zone from ear opening to about third of way from axilla to groin dark brown with vertical rows of fine white dots and some vertical invasions of lighter ventral ground color. Invasion of light ventral color more extensive posteriorly, breaking dark zone into series of about 18 vertical bars. Head brown with some darker pigment along sutures between scales. Venter pale but with much suffusion of dark pigment, also forming fine longitudinal lines, most prominent on the throat. Chest with prominent dark reticulation. Unpigmented triangular area on cloacal flap. Forearms marbled with heavy, dark brown reticulum, most prominent ventrally; hindlimbs similarly pigmented.

Etymology.—From the Greek, macro, long (large in common usage), and otos, ear, in reference to the large EAM.

Comparisons.—*Celestus macrotus* differs from all Jamaican species in some combination of meristic characters (scales mental to vent, scales around midbody, striae number) and coloration, limb length, subdigital lamellar morphology, claw shape and sheathing, and various other features (Lynn and Grant, 1940; Underwood, 1959; Schwartz, 1971). With the exception of *C. marcanoi*, all the Hispaniolan species of *Celestus*, including *C. macrotus*, have a pair of dark paramedian stripes from the nape onto the anterior trunk (absent or weakly expressed in some populations); even *C. marcanoi* has lines on the neck, however. No Jamaican species appears to have this pattern feature (Lynn and Grant, 1940). Of the five other Hispaniolan species of *Celestus*, two are moderate to large-sized, long-limbed, widespread species: *C. costatus* and *C. stenurus*. *Celestus curtissi* is a smaller, short-limbed xerophile, and there are two montane species on the north island, *C. darlingtoni* and *C. marcanoi*, both small, long-limbed species. Schwartz (1964) noted that none of these species is always distinguishable on the basis of meristic characters. The principal differences are in head shape, particularly snout shape, elongation of the body, limb proportions, to some extent the shapes of the head scales, keeling, and coloration.

In the region of Hispaniola where the holotype of *C. macrotus* was taken, both *C. costatus* and *C. stenurus* occur. These two species show considerable geographic variation throughout their extensive Hispaniolan ranges (Schwartz, 1964). *Celestus costatus* is more of an upland species in this region of southern Hispaniola, whereas *C. stenurus* is a lower elevation xerophile (these distinctions do not hold throughout Hispaniola). The proportionately long limbs of *C. macrotus* distinguish it from the short-limbed *C. curtissi.* In its rounded snout, *C. macrotus* resembles *C. stenurus* rather than *C. costatus* whose snout is more pointed and wedgelike. However, in the low number of strigae on the dorsal scales it differs from both *C. costatus* and *C. stenurus,* which have about 20–27 strigae. The dorsal scales of *C. macrotus* are unkeeled (though strigate), whereas in *C. stenurus* they are prominently keeled, and in *C. costatus* they are smooth in adults but keeled in juveniles (Thomas, 1966). *Celestus macrotus* further differs in the large EAM, the small tubercular scales around the ear opening, the diagonalized lateral scales, and in coloration. The dorsal pattern of *C. stenurus* is composed of relatively bold dark markings: numerous spots, dashes or diagonal marks (herringbone pattern) and bold paramedian stripes; the sides are vertically barred. *Celestus costatus* has more sharply demarcated dorsal and lateral zones of body color; the dorsal pattern varies from unpatterned to spotted or herringboned. *Celestus curtissi* is found in the Cul de Sac Plain of Haiti and other xeric lowland regions of the island; it is sharp-snouted, relatively long-bodied and short-limbed, and has around 21 strigae on the dorsal scales. The midbody scale count of 41 for *C. macrotus* exceeds the counts of all subspecies of *C. curtissi* except *C. curtissi aporus* of the Barahona region (Schwartz, 1964). The dorsum of *C. curtissi* is an unpatterned or nearly unpatterned metallic tan with faint nuchal lines; the lateral zone is dark (variable in extent) and may have spots but is not vertically barred, as in *C. macrotus*.

Two species of small *Celestus* are known only from the high elevations of the Cordillera Central of the Dominican Republic, *C. darlingtoni* and *C. marcanoi*. The fine longitudinal dorsal lines of *C. macrotus* are reminiscent of the pattern of *C. darlingtoni*, but it differs from the latter species in having shorter lines that do not extend onto the posterior dorsum. *Celestus macrotus* differs from both of these other high-elevation species in having fewer strigae on the dorsal scales (around 20 per dorsal scale for *marcanoi* fide Schwartz and Incháustegui, 1976, and 11–12, mode 11, in *C. darlingtoni*). The color pattern in *marcanoi* is non-lineate with blotches or short diagonal elements. The large EAM of *C. macrotus* appears to be a real feature and not an artifact of preservation, even though in some preserved diploglossines one can see that the tympanum has been pushed outward by turgor changes after preservation. In the holotype of *C. macrotus*, the edge of the tympanum is more deeply set inward from the opening of the EAM than it is in the other species that we examined, and the ventral part of the cavity is more spacious.

An important aspect of the scale morphology of these anguids is the presence of fine longitudinal ridges on many of the scales. Thomas (1966) used the term striae when specifically discussing the ridges (for meristic data, whether ridge or groove is counted does not matter), but etymologically striae should refer to the grooves between the ridges (Peters, 1964). We therefore use the Latin word striga (pl. strigae), meaning a row of grain or windrow, for the ridges. Thomas (1966) noted the ontogenetic development of strigae on the scales of *C. costatus badius*, in which they begin in young individuals as aligned tubercules that gradually coalesce, so that by adulthood the strigae are regular ridges with no (or very little) indication of the tubercules on most of the dorsal scales (limb and axillary scales, which are also strigate, regularly coalesce incompletely). This sequence is also true of many (perhaps all) species in the genus, although in some, such as *C. crusculus* and *C. barbouri*, the coalescence may be incomplete on the dorsal scales of adults. Specimens of *C. stenurus* of the same SVL as the holotype of *C. macrotus* show markedly incomplete coalescence of the tubercules on many of the dorsal scales, whereas in the holotype of *C. macrotus* coalescence is complete (no indication of tubercules). In very small juveniles of *C. stenurus*, and presumably other species of *Celestus*, one obtains lower strigae counts than in the adults, because the strigae are as yet incompletely formed from tubercules. In the holotype of *C. macrotus* they are fully formed. The median keels of the dorsal scales of *C. stenurus* are also prominent in juveniles but absent in *C. macrotus*. Qualitatively, the strigae of *C. macrotus* are more rounded, and they diminish pronouncedly on the scales of the sides of the body, so that the lateral scales are virtually smooth, whereas strigae are prominent on the lateral scales of *C. stenurus* and *C. costatus*. That the strigae of *C. macrotus* are fully formed at 60 mm SVL implies that it is probably a small species. At this size the process is incomplete in *C. stenurus* and *C. costatus*. *Celestus macrotus* appears to have the fewest strigae of any member of the genus; we surveyed *C. barbouri*, *C. costatus*, *C. crusculus*, *C. curtissi*, *C. darlingtoni*, *C. hewardi*, *C. marcanoi*, *C. stenurus*, and *C. occiduus*.

To a greater degree than in other *Celestus*, the body scales of *C. macrotus* change from symmetrically cycloid on the dorsum to asymmetrical on the sides (the ventral scales become symmetrical again). The diagonalization ratio (Fig.

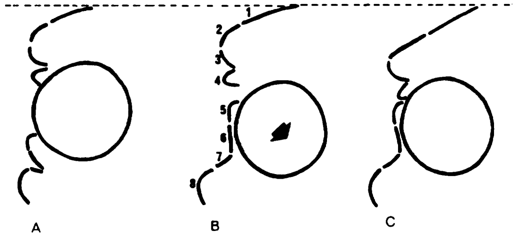

Fig. 4. Scutellation of the eyelids and adjacent regions in diagrammatic cross section. A shows the eye open normally; B shows the eyeball retracted in response to the approach of an object, and C shows complete closure achieved by downward movement of the supraoculars. Numbers as in Figure 3.

2) is .22–.28, whereas in *C. stenurus* it is .43–.57, *C. costatus* .37–.52, and in *Wetmorena haetiana* .35–.46. On the asymmetrical scales the strigae may retain an anterior-posterior orientation, or they may orient dorsoposteriorly, as in *macrotus.*

Although not yet completely analyzed, electrophoretic data indicate that *C. macrotus* falls outside of a cluster of species that includes *C. barbouri, C. costatus, C. crusculus, C. curtissi, C. darlingtoni,* and *C. stenurus.*

Habitat.—The holotype of *C. macrotus* was collected in high elevation pine forest (*Pinus caribaea*). Since we did not immediately distinguish it from the abundant *W. haetiana,* which has a similar dorsal pattern, we do not know the precise situation from which it came. We collected these anguids beneath limestone rocks and rotten logs. The forest there is moist and mossy, in contrast to the drier pine forest found in some areas of the Massif de la Selle and the adjacent Sierra de Baoruco.

Remarks.—Previous descriptions of the eye region scales of diploglossines have not been entirely satisfactory. The usual terminology seems to follow, or at least be similar to, that used by Taylor (1935) for *Eumeces* and Smith (1946) for *Gerrhonotus* and scincids (Underwood, 1959; Myers, 1973), and this is not only insufficiently detailed for *Celestus* and most of the other diploglossines but is contradicted by Peters (1964). Since some of the eyelid scales are partly concealed in almost all specimens, we show the scale sequence and our terminology in the diagrammatic cross sections of Figure 4. In shutting the eye, the eyeball is withdrawn backwards and somewhat downwards away from both lids (Fig. 4B). Little or no change occurs in the upper lid, although there is a hinge between the upper ciliaries and the upper marginal ciliaries; but the lower lid is flattened inwardly, apparently by intrinsic muscular action. The angle between the palisade palpebrals and the lower palpebrals (another hinge) increases as the eye is withdrawn. The lower marginal ciliaries deflex (curvature is decreased), and the inner edge may (it does not always) seal against the eyeball. Thus with the eye closed (really, retracted) there is a space between the eye and upper eyelid; there is no vertical movement of the eyelids, and they do not come together under force of muscular contraction, as in many other lizards, even autarchoglossans—e.g., *E. laticeps.* The entire roof of the orbit (supraoculars) can be depressed, and in this way the eyelids may completely close (Fig. 4C). We observed eye closing in a living specimen of *Diploglossus pleei,* whose eyelid structure is virtually identical to that of the various species of *Celestus,* with the exception of *C. microblepharis.* In a living skink (*E. laticeps*), the lower eyelid moves upwards over the eye in closing, the upper lid being fixed (there are no intercalary palpebrals); the two lids meet rather firmly. Retraction of the eyeball is so slight as to be hardly noticeable.

We apply the term ciliary (from the Greek for eyelash) as did Peters (1964) to those scales along the margins of the eyelids—upper and lower ciliaries. We apply the term supraciliaries to the row of scales just below the supraoculars (Taylor, 1935; Smith, 1946). The intervening scale row of upper eyelid scales in *Diploglossus* and *Celestus* (which may be present, absent, or incomplete in other species of autarchoglossans, whether anguids or scincids) we term the intercalary palpebrals. Palpebral (from the Latin for eyelid) appropriately applies to scales on the surface of the lids; on the lower lids the palpebrals are often involved in the formation of a translucent window. The window in *Diploglossus, Celestus,* and many skinks is formed by several large, thin, vertically elongate scales, which become divided towards either canthus (evolutionarily, they probably fuse to form the undivided palpebral disk of a number of skinks and ultimately the ablepharine type of eyelid—Greer, 1974). These large, flat scales of the lower eyelid, including the divided scales, we term the palisade palpebrals; the palisade palpebrals hinge with the lower palpebrals, which abut on the suboculars (Figs. 3–4).

The Massif de la Selle is a long, east-west montane uplift extending from approximately the region of the Trouin Valley east to the vicinity of the Dominican-Haitian border (Woodring et al., 1924), where it is not sharply distinct from the Sierra de Baoruco in the Dominican Republic. Within the 100 km extent of the Massif de la Selle are included a number of more or less discrete montane masses (mornes on modern maps, sometimes monts on older maps). In the central zone of the massif, the easternmost of these masses is the Chaine de la Selle. With about 14 km east-west extent above 2000 m, it is separated from the western mornes (Visite, Bois Pin, and Kadeneau) by about 10 km that is below 2000 m. The highest point of the Chaine de la Selle is 2674 m, but there is no really distinct peak; the term Pic La Selle should be applied only to the small area extending above the rest of the Chaine. The term Morne (or Mont) de la Selle is also confusing, since it seems to have been applied to both the peak and to the entire chain. We use Chaine de la Selle, since it is unambiguous and is used on the topographic maps published by the Haitian Geodesic and Cartographic Service.

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