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Ontogenetic color changes may strengthen suggestion about systematic affinities between two species of *Chironius* (Serpentes, Colubridae)

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The neotropical colubrid snakes of the genus *Chironius* include 20 species that dwell mainly in rainforests of Central and South America (Dixon *et al.* 1993). These medium to large snakes are diurnal, arboreal to terrestrial, and feed upon frogs (Dixon *et al.* 1993, Sazima and Haddad 1992, Marques *et al.* 2001). Several species are arboreal and their ground color are green (e.g. Campbell and Lamar 1989, Dixon *et al*. 1993, Marques *et al*. 2001). Their morphology also reflect their arboreal habits as these snakes have large eyes, slender bodies, and long tails (Dixon *et al.* 1993, Marques 1998).

Ontogenetic color changes are common within the genus, juveniles sometimes differing markedly from adults (Dixon *et al.* 1993, Marques *et al.* 2001). *Chironius flavolineatus* is regarded as the only species with no ontogenetic color changes (Dixon et al. 1993), but a close examination of preserved juvenile specimens revealed faint cross-bands in some of them (OAVM, pers. obs.). Upon examining preserved specimens Dixon *et al*. (1993) note that only *C. laevicollis* and *C. scurrulus* juveniles have uniform color, albeit different from that presented by adults. Here we present the notable color ontogenetic changes recorded in life for these two species of *Chironius* and relate these changes to their proposed systematic affinities (Dixon *et al.* 1993).

We examined live individuals of *Chironius laevicollis* and *C. scurrulus* in the field and captivity, photographs of live individuals, and preserved specimens in the herpetological collection of the Instituto Butantan (IB). In both species the ground color of neonates and juveniles up to 30 cm SVL is uniformly green (Figure 1A, D). In larger juveniles and adults the ground color is yellowish brown (*C. laevicollis*) or reddish brown (*C. scurrulus*), the fore-body black with posterior dorsal scales edged with black or dark brown (Figure 1B, E). As the snakes grow larger, their hind-body become gradually darker, and in very large individuals the ground color is black (Figure 1C, F).

Recent studies on morphology and feeding habits indicate that the extent of arboreality differ among *Chironius* species from the Atlantic forest of southeast Brazil (Marques 1998, Marques and Sazima in press). *Chironius laevicollis* has a stout body, short tail and feed mostly on leptodactylids, showing the typically

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Figure 1 - Ontogenetic colour changes in *Chironius laevicollis* (A-C) and *C. scurrulus* (D-F), juveniles (A and D), small adults (B and E), and large adults (C and F). *Chironius laevicollis* lengths and collection numbers: (A) about 300 mm TL, unregistered; (B) 1250 mm SVL, 560 mm tail length, unregistered; (C) 1435 mm SVL, 620 mm tail length, IB 57096. The same for *C. scurrulus*: (D) 313 mm SVL, 136 mm tail length, unregistered; (E) 1030 mm SVL, 510 mm tail length, IB 65723; (F) 1160 mm SVL, 550 mm tail length; IB 65004. Juvenile *C. scurrulus* photographed by M. Martins.

terrestrial trends within the genus (Marques 1998, Marques *et al*. 2001). Our field records of active adults are all on the ground (n = 8) whereas other *Chironius* species from the Atlantic forest use vegetation habitually or at least more extensively (Sazima and Haddad 1992, Marques and Sazima in press, pers. obs.). Of three *C. laevicollis* juveniles we recorded in the field, one was in a bromeliad above the ground, the other was climbing a shrub about 1.5 m tall, and the third was crossing a dirty road. Thus, the green color of juveniles is possibly related to their more pronounced arboreal habits. Field data on *C. scurrulus* is scarce but this snake is primarily terrestrial when active, and uses vegetation to rest by day and to sleep at night (Martins and Oliveira 1999). We suggest that juveniles of *C. scurrulus* are more arboreal than the adults, similarly to what we recorded for *C. laevicollis*.

Dixon *et al*. (1993) propose that *C. laevicollis* and *C. scurrulus* are relatively young sister species. Differentiation between these two species may have occurred during the last fragmentation between Amazonian and Atlantic forest 300,000-800,000 years ago (Zamudio and Greene 2000). The similarity of color ontogenetic changes shown here, and unrecorded for any other *Chironius* species to date, may strengthen the sister species concept suggested by Dixon *et al.* (1993).

Martins and Oliveira (1999) suggest that the green juveniles of *C. scurrulus* mimic the also green, mildly venomous and aggressive colubrid *Philodryas viridissimus*, and a similar suggestion may perhaps apply to the pairs *C. laevicollis-P. olfersii* in the northern portion and *C. laevicollis-P. aestivus* in the southern portion of the Atlantic forest (Marques *et al.* 2001). Both *Philodryas* species show arboreal habits (Sazima and Haddad 1992, Martins and Oliveira 1999, Marques *et al*. 2001) as do the juveniles of the two *Chironius* species commented here.

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