

*capensis*<sup>1</sup>, Magnolia Warbler *Setophaga magnolia*<sup>7</sup> and Common Crossbill *Loxia curvirostra*<sup>3</sup>.

Furthermore, active brood patches are difficult to recognise as many passerines possess little or no down or feathers on the abdomen, thus the belly areas of some young can appear like that of an adult that is starting to develop a brood patch, but they are quite smooth and pink or red<sup>6</sup>.

I report the presence of brood patches in juveniles of four Neotropical birds: Violet-chested Hummingbird *Sternoclyta cyanopectus*, Scrub Greenlet *Hylophilus flavipes*, Southern Beardless Tyrannulet *Camptostoma obsoletum* and Bananaquit *Coereba flaveola*.

I noted those individuals that presented brood patches in phases two and three *sensu* Pyle<sup>4</sup>. Phase two is characterised by an increase in the size of the blood vessels in the abdomen, and the skin is thicker and filled with fluid, while in phase three the skin of the abdomen appears greyish and wrinkled. To differentiate brood patches from feather moult on the abdomen, the skin's appearance was examined. If it did not present an edemous or wrinkled appearance, I did not consider the bird to have a brood patch.

On 7 July 2011 I trapped a juvenile female Violet-chested Hummingbird with a wrinkled brood patch at Portachuelo Pass, Aragua state, Venezuela (10°24'N 67°35'W; 1,136 m); it was identified by the malar stripe<sup>6</sup> during the breeding season (March–July; Fig. 1). The juveniles of Scrub Greenlet, Southern Beardless Tyrannulet and Bananaquit were trapped in the Arboretum Experimental Station, Caracas, an urban fragment of deciduous forest (10°28'N 66°53'W; 1,100 m), between February and July 2014 (1 March, 20 February, 26 July, respectively). The greenlet and tyrannulet had vascularised brood patches (Figs. 2) while the Bananaquit had a wrinkled patch (Fig. 3). They were identified as juveniles by their beige gapes and in Bananaquit also by the dull plumage<sup>6</sup>.

### Brood patches in juveniles of four bird species in Venezuela

Brood patches consist of areas of thickened, naked skin richly supplied with blood vessels that facilitate heat transfer to the eggs during incubation<sup>9</sup>. While brood patches are a characteristic of breeding adults, they are rare in juveniles, having been reported only in a few species, e.g. Rufous-collared Sparrow *Zonotrichia*

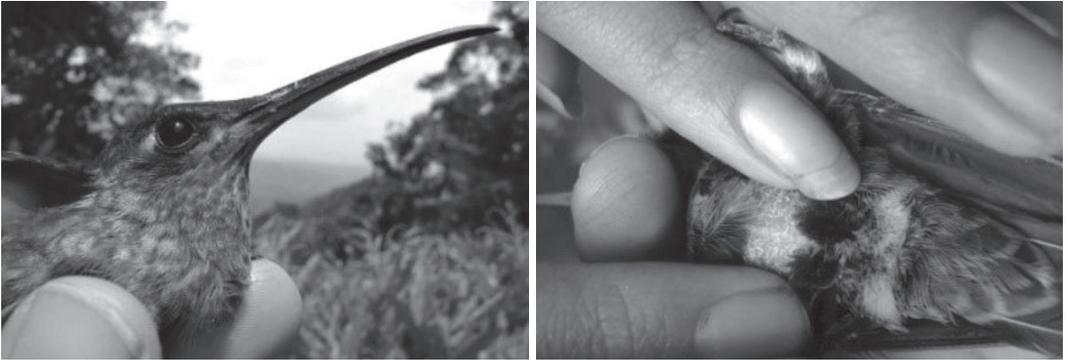


Figure 1(a). Juvenile female Violet-chested Hummingbird *Sternoclyta cyanopectus* with brood patch (b), Portachuelo Pass, Aragua state, Venezuela, July 2011 (Cristina Sainz-Borgo)



Figure 2(a). Juvenile Scrub Greenlet *Hylophilus flavipes* with brood patch, Arboretum Experimental Station, Caracas, Venezuela, March 2014 (Cristina Sainz-Borgo)



Figure 3(a). Juvenile Bananaquit *Coereba flaveola* with brood patch (b), Arboretum Experimental Station, Caracas, Venezuela, February 2014 (Sandra B. Giner Ferrara)

All four juveniles were trapped within their respective species' breeding periods. However, several bird species retain juvenile plumage during their first years of adulthood. Breeding behaviour in juveniles is poorly known, with the exception of some Palearctic species like Pied Flycatcher

*Ficedula hypoleuca*<sup>2,8</sup>. In addition, as some brood patches in juveniles might be confused with moult, further research is required to shed light on this subject.

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