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GROWTH OF A NEOTROPICAL TYRANNID: THE CINNAMON FLYCATCHER (*PYRRHOMYIAS CINNAMOMEA*)

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INTRODUCTION

Growth patterns of temperate zone passerines have attracted much attention (Ricklefs 1968, 1973; O'Connor 1984). However, comparatively few data are available for many Neotropical species (Ricklefs 1976). Logistical difficulties and brief periods of remote field work have frequently combined to reduce sample sizes below optimal to assure firm conclusions. We present here data on nestling growth of an additional Neotropical tyrannid, the Cinnamon Flycatcher (*Pyrrhomyias cinnamomea*) but must rely on data from two nests in different years.

The Cinnamon Flycatcher is a small, bright cinnamon-colored flycatcher that ranges throughout the mountains of South America, from Venezuela south through Colombia, Ecuador, Peru, and Bolivia to northwest Argentina. It inhabits the upper tropical and subtropical zones at elevations of 700 to 2900 m (Collins & Ryan 1995). Cinnamon Flycatchers prefer to forage and nest in open areas of the forest such as along road cuts, near buildings, landslides, tree-fall gaps and streambeds (Meyer de Schauensee & Phelps 1978, Collins & Ryan 1995). The clutch size is two eggs, incubated by both parents for 20–21 days (Collins & Ryan 1995). The nest is an small open cup composed of locally available vegetation and spider webs, placed on a ledge or rock outcrop on a near-vertical bank (Collins & Ryan 1995). These flycatchers are solitary nesters and aggressively defend their territory against conspecifics (Beebe 1949).

METHODS

We conducted this study near Estación Biologíca "Alberto Fernández Yepes" Rancho Grande (EBRG) in Parque Nacional Henri Pittier, Estado Aragua, Venezuela. One nest was located along a road cut in 1972 and the other nest on the building at EBRG in 1993 (Collins & Ryan 1995). The observations took place from March to July 1972 (Collins) and March to July 1993 (Ryan). We recorded the daily increase in body mass, wing (chord), and

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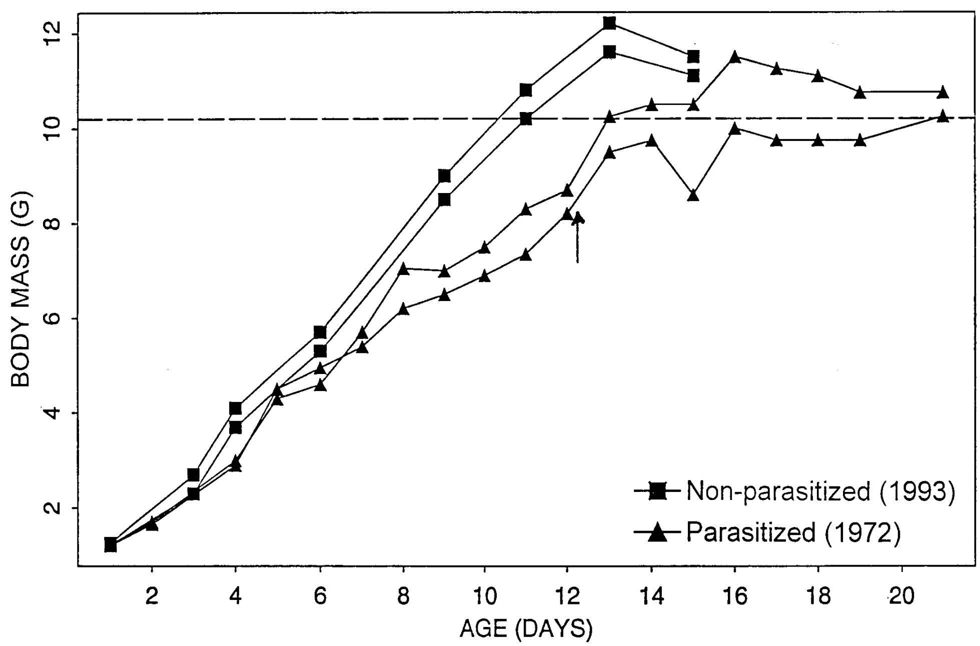

FIG. 1. Increase in the body mass of non-parasitized (1993) and parasitized (1972) nestling Cinnamon Flycatchers. The plot-wise dashed line represents adult body mass of 10.2 g (Dunning 1993). The arrow indicated when the parasitic fly larvae were removed from the parasitized (1972) nest.

tail length (center rectrix) of the two chicks in each of two Cinnamon Flycatcher nests, one in 1972 and one in 1993. We used a ruler with a wingstop to measure wing and tail length, and pesola spring balances (10 x 0.2 g and 30 x 1.0 g) to weigh the chicks.

Because we conducted these studies in a national park, there was little appreciable change in the overall physical environment despite the number of years between observations. No climatic data is available for this site for comparison between years; field notes indicate similar conditions during the study period. The nest studied in 1972 contained ectoparasitic fly larvae, while the nest in 1993 did not.

RESULTS AND DISCUSSION

The mean nestling mass at hatching in both years (two nestlings per nest) was 1.25 g (range 1.2–1.3 g) (Fig. 1). In 1993, the nestlings reached their asymptotic mass of 11.6 g and 12.2 g on the 13th day. Their mass receded somewhat to 11.1 g and 11.5 g by day 15. Adult body mass is 10.2 g (Dunning 1993). These nestlings were not disturbed after day 15 to prevent premature fledging. They left the nest on day 20 (Ryan & Collins 1995). In 1972, the nestlings did not reach their asymptotic mass of 11.5 g and 10.0 g until day 16. Their mass then gradually declined to 10.8 g and 9.8 g until they left the nest "explosively" on day 22 (Collins & Ryan 1995). This was perhaps 1–2 days sooner than if they had not been handled.

Detached fly larvae were noted in the bottom of the 1972 nest on 3 and 4 June when the chicks were 11 and 12 days old. In total, we removed 18 larvae from the nest.

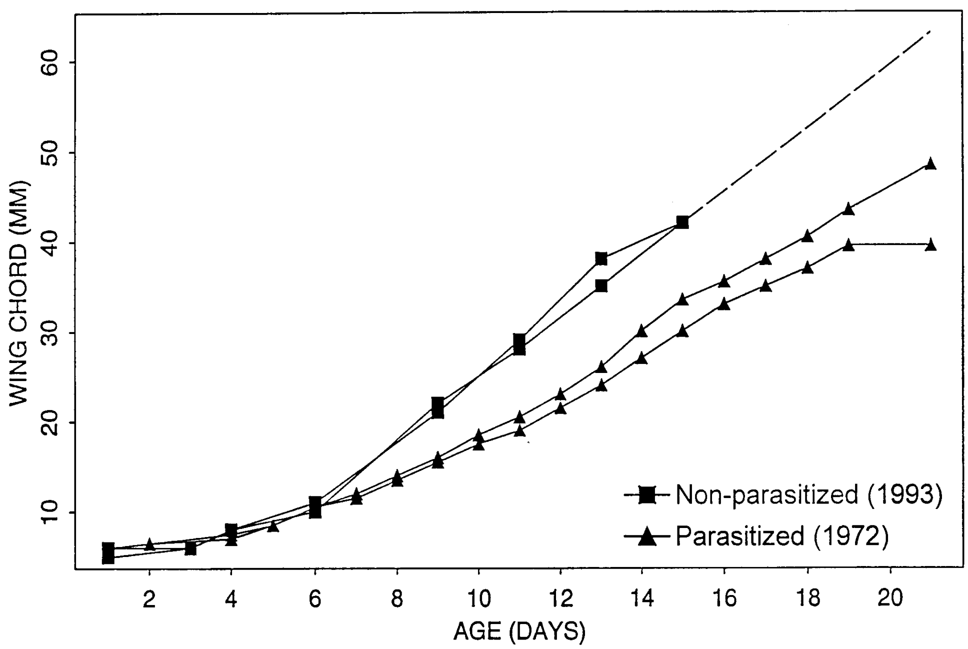

FIG. 2. Wing chord growth in non-parasitized (1993) and parasitized (1972) nestling Cinnamon Flycatchers. The dashed line represents the growth of the wing of the 1993 nestlings extrapolated to the expected length at fledging on day 21. Growth of the wing is linear during this portion of the growth period.

Although exact identification was not made, their behavior and feeding methods were similar to that of the North American genus *Protocalliphora*. The larvae appeared ready to pupate when removed.

Since the combined growth of the long bones and feathers of the wing is nearly linear in many nestling passerines (Collins unpubl.), we could estimate the wing length of the non-parasitized (1993) nestlings to have been 63.0 mm at fledging (Fig. 2). This is 95% of the adult wing length of 66.0 mm (n = 13 specimens, Nat. Hist. Mus. of Los Angeles Co.). The parasitized (1972) nestlings had wing lengths of 48.5 and 45.5 mm at fledging or 69–73% of the adult wing length. We estimate these nestlings required six additional days to reach their adult wing length (Fig. 2). Similarly, tail length at fledging was estimated to have been 35 mm or 65% of adult tail length in the non-parasitized (1993) nestlings and only 23 mm or 42% of adult tail length in the parasitized (1972) nestlings (Fig. 3).

Many kinds of ectoparasites (flies, fleas, and mites) have been recorded in nests and on nestlings of a variety of avian species (Rothschild & Clay 1952, Loye & Carroll 1995). In South America, the presence of subdermal dipteran larvae has been recorded from several species of birds (Oniki 1983, Loye & Carroll 1995). Ectoparasitic larvae which remain in nest material and emerge to feed on developing chicks, notably flies of the genus *Protocalliphora*, have been widely documented to occur in North America (Gold & Dahlsten 1983, Rodgers *et al.* 1991), but less frequently documented in the New World tropics.

Ectoparasitic fly larvae remove blood and other bodily fluids and tissue from growing

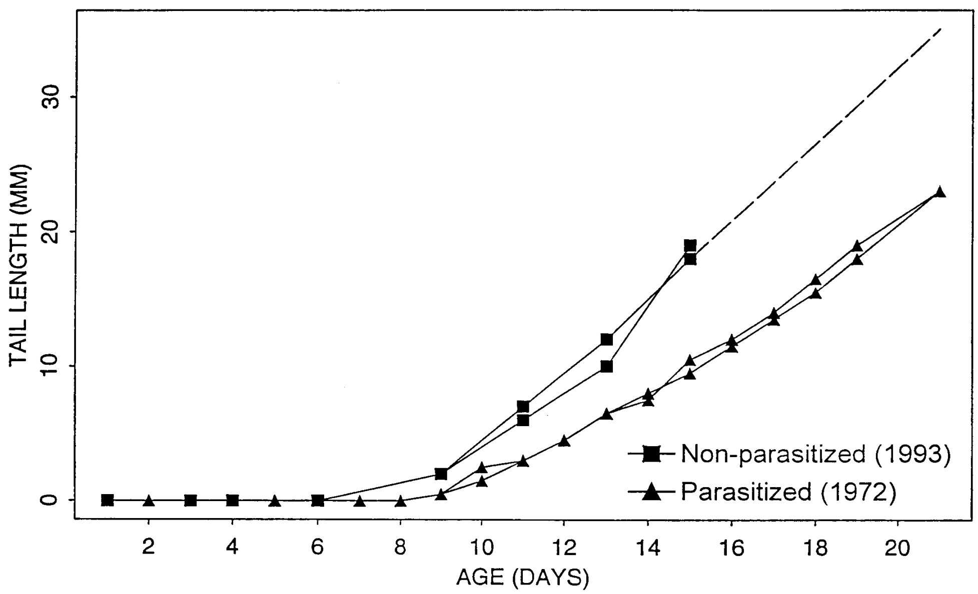

FIG. 3. Tail development in non-parasitized (1993) and parasitized (1972) nestling Cinnamon Flycatchers. The dashed line represents the growth of the tail of non-parasitized nestlings extrapolated to the expected length at fledging on day 21. Growth of the tail is linear during this portion of the growth period.

chicks causing an energy drain that may in turn affect their development (Uhazy & Arendt 1986). Nestlings that experience blood and tissue loss must reallocate energy from maintenance and growth to regeneration and repair (Uhazy & Arendt 1986, Chapman & George 1991, Rodgers *et al.* 1991). Such reallocation explains observations of several passerine species in which parasitized nestlings exhibited lower asymptotic mass and fledgling mass, as well as shorter primaries and rectrices (Winterstein & Raitt 1983, Arendt 1985, Chapman & George 1991). Energy loss due to parasitism can be a causative factor of nestling mortality and affect post-fledgling success (Rothschild & Clay 1952, Moss & Camin 1970, Gold & Dahlsten 1983, Arendt 1985, Rodgers *et al.* 1991, Loye & Carroll 1995). The young in both of the nests we studied fledged successfully. However, the chicks in the parasitized (1972) nest reached a lower asymptotic mass three days later, and fledged 2–4 days later, than in the non-parasitized (1993) nest.

The study of these two nests, serve to provide additional information on the affects of ectoparasitic fly larvae on the growth of nestlings of Neotropical passerines. Although this sample size is too small to make any definitive conclusions, these data support the findings of others. They support Sabrosky *et al.* (1989), in that parasitic larvae do not always kill nestlings or fledglings outright, but may weaken or delay the maturation of nestlings so that other factors such as predation becomes more significant. They support Arendt (1985) as an example of fledglings from a nest with a lesser parasite burden (one to 30) exhibiting retarded growth. When the incidence of parasitism is high, it may exert a considerable, but less documented pressure on the reproductive success of Neotropical birds. We look forward to further studies documenting the impact of parasite-induced retarded growth on the survivorship of nestlings of Neotropical birds.

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